MICROWAVE SILICON COMPONENTS

CONTENTS

INTRODUCTION

This part of the Microwave section presents TEKELEC TEMEX's product lines including:

- receiving diodes
- control diodes
- tuning varactors
- multiplier varactors
- step recovery diodes
- high voltage PIN diodes

TEKELEC TEMEX's products are available in a complete assortment of packages including:

- chips
- standard
- surface mount ceramic and plastic
- non magnetic
- custom

IN-HOUSE PRODUCTION

The silicon slice is the in-house starting point of TEKELEC TEMEX's product manufacturing. From the virgin wafer, TEKELEC TEMEX performs all functions, including:

- epitaxy
- diffusion
- photomasking
- metallization
- passivation
- dicing
- packaging
- control and burn-in

TEKELEC TEMEX uses and controls ten separate silicon-related technologies, e.g. all Schottky metallurgies, all junction passivations, and all mesa operations.

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SYMBOLS

C_b	Case Capacitance
C_j	Junction Capacitance
C_T	Total Capacitance
C_X/C_y	Tuning Ratio
f	Test Frequency
F_{CO}	Cut-off Frequency
F_I	Frequency Input
F_{IF}	Intermediate Frequency
F_O	Output Frequency
F_{oper}	Operating frequency
I_F	Forward Continuous Current
I_R	Reverse Continuous Current
I_{RP}	Reverse Pulse Current
L	Conversion Loss
N/A	Not Applicable
NF_{SSB}	Single Sideband Noise Figure
NF_{IF}	Noise Figure of Intermediate Frequency
∅	Gold Contact Diameter
P_{CW}	CW Power Capability
P_{diss}	Power Dissipation
P_{in}	Power Input
P_L	Limiting Threshold
P_{LO}	Local Oscillator Power
P_O	Output Power
P_{RF}	RF Power
Q_{-X}	Figure of Merit
R_{SF}	Forward Series Resistance
R_{th}	Thermal Resistance
R_V	Video Resistance
τ_l	Minority Carrier Lifetime
T_{CR}	Reverse Switching Time
T_j	Junction Temperature
t_{SO}	Snap-off Time
T_{SS}	Tangential Sensitivity
V_{BR}	Breakdown Voltage
V_F	Forward Continuous Voltage
V_R	Applicable Voltage (RF + bias)
VSWR	Voltage Standing Wave Ratio
V_T	Forward Threshold Voltage
V_{TO}	Threshold Voltage
Z_{IF}	Impedance at Intermediate Frequency
Z_O	Output Impedance

SILICON PIN DIODES

Selection Guide

SURFACE MOUNT PACKAGE

PLASTIC PACKAGE SWITCHING SILICON PIN DIODES
PLASTIC PACKAGE ATTENUATING SILICON PIN DIODES
SQUARE SURFACE MOUNT PIN DIODES
HIGH VOLTAGE SQUARE SURFACE MOUNT PIN DIODES
NON MAGNETIC SQUARE SURFACE MOUNT PIN DIODES

HIGH VOLTAGE PIN DIODES

SWITCHING & PHASE SHIFTING APPLICATIONS
TWO AND THREE PORTS RF PIN SWITCH MODULES

MICROWAVE APPLICATIONS

ULTRAFAST SWITCHING SILICON PIN DIODES
FAST SWITCHING SILICON PIN DIODES
ATTENUATOR SILICON PIN DIODES
SILICON LIMITER PIN DIODES

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HOW TO SPECIFY A PIN DIODE

To obtain the PIN diodes best suited for a specific application, consider the following:

1. Application
   - switch
   - attenuator
   - limiter
2. Frequency and bandwidth requirements
3. Power characteristics
   - peak
   - average
   - pulse duration and duty cycle
4. Switching time
5. Bias conditions
   - forward
   - reverse
6. Circuit impedance
7. Shunt or series assembly
8. Maximum loss expected
9. Minimum isolation needed
10. VSWR and distortion requirements
11. Power applied to the diode
    - forward biased
    - reverse biased
    - during switching
12. Static characteristics
    - applicable voltage: V_R
    - total capacitance: C_T (in space charge)
    - forward series resistance: R_{SF}
    - carrier lifetime τl
    - thermal resistance: R_{th}
13. Mechanical and packaging constraints

SOT23 SURFACE MOUNT SWITCHING SILICON PIN DIODES

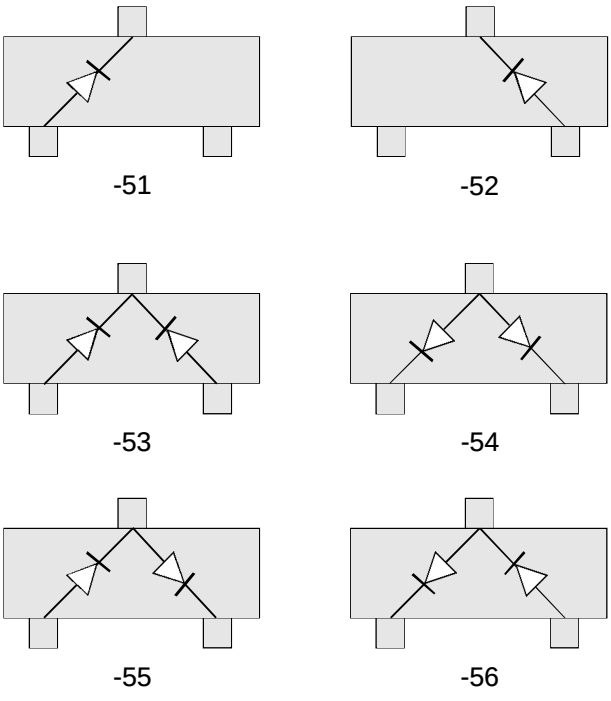
Features

- Low series resistance
- Low capacitance
- Fast switching diodes
- Surface mount package
- Tape and reel packaging available

Description

TEKELEC TEMEX uses its proprietary technology to manufacture its Silicon PIN diodes in **SOT23**.
This product family is designed for a low cost, medium to high volume market that may be supplied in tape and reel for automated pick and place assembly on surface mount circuit boards.
The use of this technology eliminates wire bonding directly on to the chips.

Outline drawing



-51 -52

-53 -54

-55 -56

(Top view)

Nota: Other plastic packages available.

Applications

The DH50XXX series PIN diodes are offered in large selection of capacitance range (.30 pF to 1.2 pF) and breakdown voltage (35 V to 200 V). They provide low loss (low series resistance), low switching time and low switching current.
TEKELEC TEMEX's components are designed to cover a broad range of CW low power (up to 2 W), medium peak power, RF and microwave applications (up to 3GHz).
Main applications include: SPST and SPDT switches, antenna (Wireless Communication Systems) and filter switches, Phase Shifters...

Note: To reduce the distortion, it is necessary to verify and design with the following formula:

$$\frac{\hat{I}_{HF}}{\pi \tau_l I_{DC} F} << 1$$

$\hat{I}_{HF}$: RF peak current (A)
τ_l : Diode minority carrier lifetime(s)
I_{DC} : DC bias current (A)
F : Application frequency (Hz)

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Electrical characteristics at 25° C

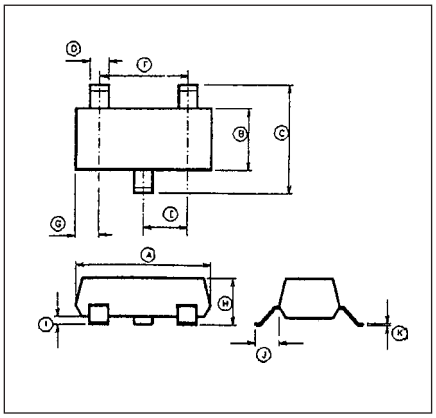
PACKAGED DIODES				
	Breakdown Voltage V_{BR} (1)	**Total capacitance C_T (2)**	**Series Resistance R_{SF}**	**Minority Carrier lifetime τ_I**
Test conditions	**I_R = 10 µA**	**F = 1 MHz V_R = 50 V**	**I_F = 10 mA F = 120 MHz**	**I_F = 10 mA I_R = 6 mA**
Type (3)	**V min**	**pF max**	**Ω max**	**ns typ.**
DH50051-XX	35	0.3 (5)	2.5 (4)	150
DH50058-XX	35	1 (5)	0.5	200
DH50053-XX	50	0.35 (6)	1.5	200
DH50103-XX	100	0.35	3	1000
DH50109-XX	100	1.2	0.6	1000
DH50203-XX	200	0.35	3	1000

(1) : Other breakdown value on request
(2) : other capacitance values on request
(3) : -XX Digits for internal electrical configuration
(4) : R_{SF} at I_F = 5 mA
(5) : V_R = 5 V at F = 1 MHz
(6) : V_R = 20 V at F = 1 MHz

Temperature ranges:

Operating junction (T_j) : -55° C to +150° C
Storage : -65° C to +150° C

Case style



Symbol	min	max	min	max
	Millimeters	Millimeters	Inches	Inches
K	0.1	0.13	0.004	0.005
J	0.53	0.56	0.021	0.022
I	0.05	0.1	0.002	0.0004
H	1.07	1.14	0.042	0.045
G	0.43	0.46	0.017	0.018
F	1.78	2.04	0.070	0.080
E	0.94 typ.		0.037 typ.	
D	0.43	0.45	0.017	0.020
C	2.36	2.49	0.093	0.098
B	1.3	1.35	0.051	0.053
A	2.84	3.02	0.112	0.119

SURFACE MOUNT ATTENUATING SILICON PIN DIODES

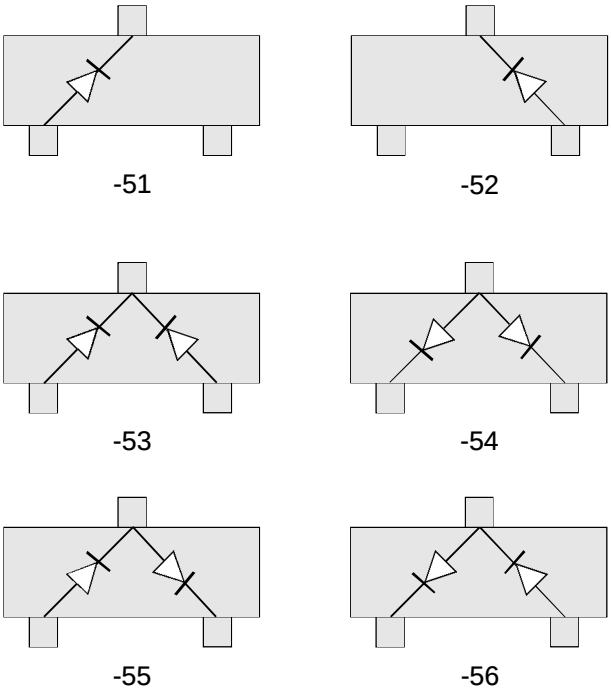
Features

- Large dynamic range
- Low harmonic distortion
- High minority carrier lifetime
- Surface mount package
- Tape and reel packaging available

Description

TEKELEC TEMEX uses its proprietary technology to manufacture its Silicon chips in **SOT23**.
This products family is designed for a low cost medium to high volume market that may be supplied in tape and reel for automated pick and place assembly on surface mount circuit boards.
The use of this technology eliminates wire bonding directly on to the chips.

Outline drawing



-51 -52 -53 -54 -55 -56

(Top view)

Nota: Other plastic packages available.

Applications

Typical applications include variable RF attenuators and AGC (Automatic Gain Control) circuits, from MHz to several GHz. The attenuating PIN diode uses properties of variation of forward series resistance versus the DC forward bias current. In order to obtain the best dynamic range, a single diode attenuator may be used in series or shunt configuration or designed as a multiple diode circuit (T or π circuit), where the device may be matched through the attenuation range.

Note: To reduce the distortion, it is necessary to verify and design with the following formula:

$$\frac{\hat{I}_{HF}}{\pi \tau_I I_{DC} F} << 1$$

$\hat{I}_{HF}$: RF peak current (A)
τ_I : Diode minority carrier lifetime(s)
I_{DC} : DC bias current (A)
F : Application frequency (Hz)

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Electrical characteristics at 25° C

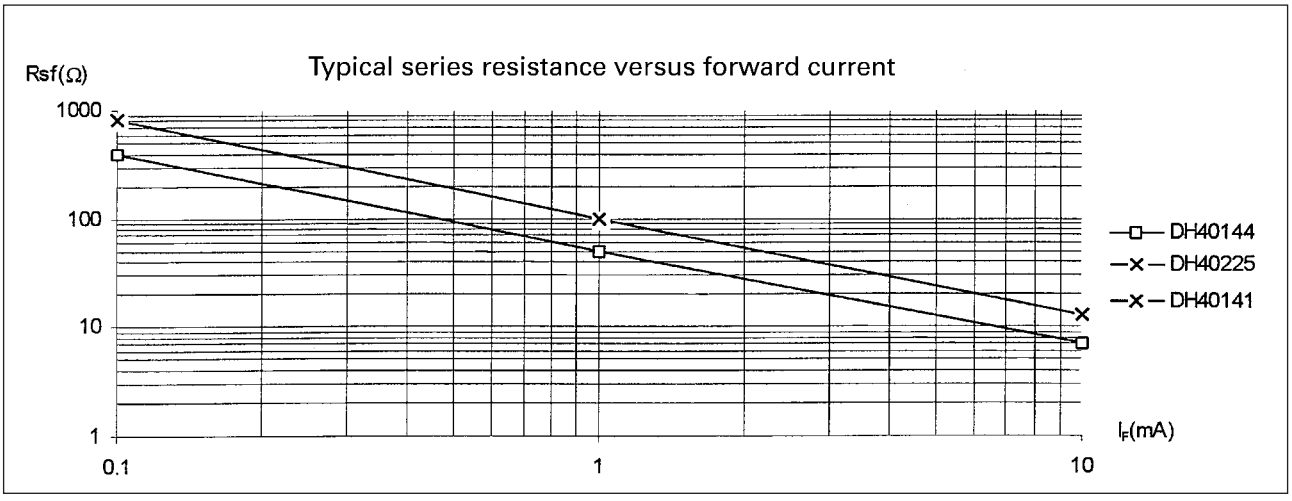
Electrical Parameters	I Zone thickness (1)	Series Resistance						Junction capacitance C_j (2)		Reverse current I_R	Carrier lifetime τ_l
Test conditions	µm	F = 120 MHz						F = 1 MHz		V_R = 100 V	I_F = 10 mA I_R = 6 mA
Type (3)		I_F = 0.1 mA		I_F = 1 mA		I_F = 10 mA		pF		µA	µs
	typ.	min	max	min	max	min	max	typ.	max	max	typ.
DH40141-XX	140	400	800	50	100	6.5	13.0	0.05	0.10	10	2.5
DH40144-XX	140	200	400	25	50	3.5	7.0	0.10	0.30	10	5
DH40225-XX(4)	220	400	800	50	100	6.5	13.0	0.10	0.30	10	7

(1) Other I zone thicknesses on request
(2) Other capacitance values on request
(3) -XX digits for internal electrical configuration
(4) New products, please call your local sales offices.

Temperature ranges:

Operating juction (T_j) : - 55° C to + 150° C
Storage : - 65° C to + 150° C

Typical performance curve



LOW COST SQUARE CERAMIC PACKAGE PIN DIODES

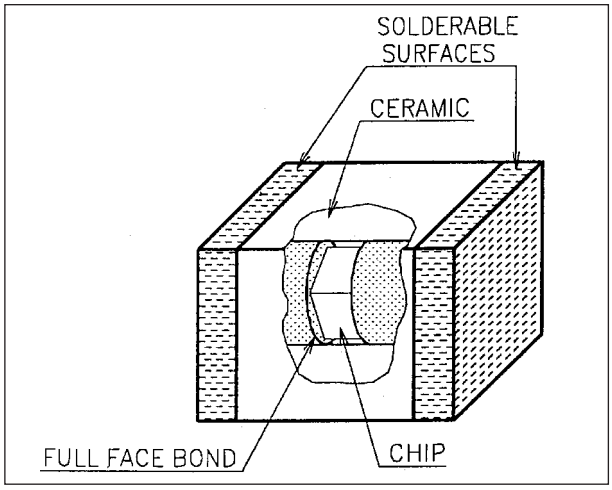
Features

- Low loss, low distortion
- Low inductance
- High reliability
- Hermetically sealed package
- Non rolling MELF design
- Pick and place compatibility

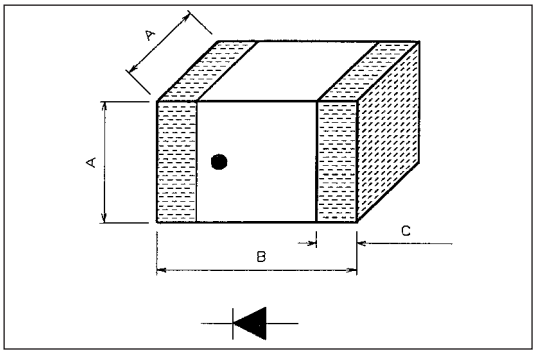
Description

TEKELEC TEMEX is manufacturing a square PIN diode for surface mount applications. The chip inside is passivated to ensure high reliability and very low leakage current. These diodes ensure high power switching at frequencies from HF to few GHz. This package utilizes ceramic package technology with low inductance and leadless faced package. The design simplifies automatic pick and place indexing and assembly. The termination contacts are tin plated for vapor or reflow circuit board soldering. The active area is a PIN glass passivated chip which can be designed to customer specifications.

Pinning



Outline drawing



		Millimiters		Inches	
Package	Symbol	min	max	min	max
	A	2	2.3	.079	.091
SMD4	B	2.9	3.5	.114	.138
	C	0.3	0.8	.012	.031
	A	2.5	2.8	.098	.0110
SMD6	B	4.7	5.2	.185	.205
	C	0.3	0.8	.012	.031
	A	3.50	3.81	.138	.150
SMD8	B	4.70	5.2	.185	.205
	C	0.20	0.38	.008	.015

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Applications

TEKELEC TEMEX square ceramic diodes are particularly suitable for high volume tape and reel assembly. Several values of total capacitance are available, together with a low forward series resistance. These components are designed to meet the low distortion specification required by all the mobile radio applications. Due to the specific design, these devices offer low loss and low thermal resistance performance and are characterized for high power handling. The electrical properties are ideal for use in antenna switches, filters, phase shifters, in all mobile radio applications from few MHz to GHz frequencies.

Electrical characteristics at 25° C

Electrical Parameter	Package	Applicable voltage V	Total capacitance C_T		Forward series resistance R_{SF}		Minority carrier lifetime τ_I	Power dissipation
Test conditions		I_R < 10 µA	f = 1 MHz V_R = 50 V		f = 120 MHz I_F = 50 mA		I_F = 10 mA I_R = 6 mA	Contact surface (1)
Type	Type	V	pF		Ω		µs	W
		max	typ.	max	typ.	max	min	max
SQM1050	SMD4 (2)	50	0.6	0.7	0.7	0.9	1	3.0
SQM1150	SMD4	200	1	1.2	0.25	0.35	1	3.0
SQM1250	SMD4	50	0.9	1.2	0.5	0.75	2	4.0
SQM1350	SMD4 (2)	50	1.5	1.7	0.4	0.6	3.5	4.5
SQM1450	SMD8	50	1.8	2.5	0.5	0.75	5	8.0

(1) diode brazed on infinite copper heat sink at 25° C
(2) standard package SMD4 also available in SMD6

Temperature ranges:

Operating junction (T_j) : -55° C to +150° C
Storage : -65° C to +150° C
Soldering : 230° C 5 Sec.

SQUARE CERAMIC SURFACE MOUNTABLE PIN DIODES

Description

These PIN diodes are manufactured in a square package (SMD) for surface mount applications. These packages utilize ceramic package technology with low inductance and axial terminations. This design simplifies automatic pick and place indexing and assembly. The termination contacts are tin lead plated for vapour or reflow circuit board soldering on Printed Circuit Boards.

These diodes are particularly suited for applications in frequency hopping radios, low loss, low distorsion, and filters in HF, VHF and UHF frequencies.

Electrical characteristics

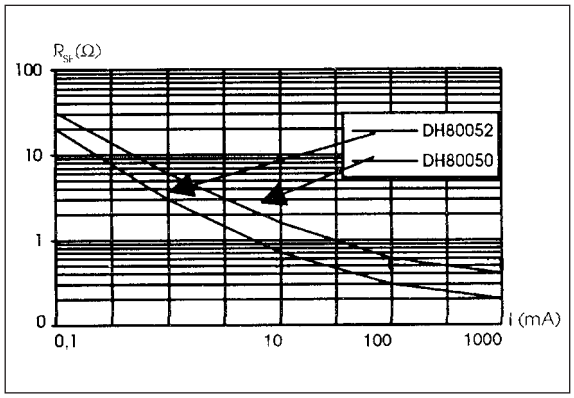
Characteristics at 25° C	Applicable Voltage V	Break-down V_{BR}	Total Capacitance C_T		Forward Series Resistance R_{SF}		Minitory Carrier τ_I	Max Power Dissipation 25° C	
TEST CONDITIONS	I < 10 µA	I < 10 µA	f = 1 MHz V_R = 50 V		f = 120 MHz I_F		I_F = 10 mA I_R = 6 mA	CONTACT SURFACE (1)	FREE AIR (2)
TYPE (3)	V	V	pF		Ω max		µs	W	W
	max	typ.	typ.	max	I=100mA	I=200mA	min	max	max
DH80050-XX	500	550	0.40	0.45	0.70	0.65	1.1	3.0	1.2
DH80051-XX	500	550	0.55	0.65	0.60	0.55	1.5	3.5	1.2
DH80052-XX	500	550	0.85	1.05	0.40	0.35	2.0	4.0	1.2
DH80053-XX	500	550	1.05	1.20	0.35	0.30	2.5	4.0	1.5
DH80054-XX	500	550	1.25	1.35	0.30	0.27	3.0	4.5	1.5
DH80055-XX	500	550	1.45	1.55	0.25	0.22	3.5	4.5	1.5

(1) Diode brazed on infinite copper heat sink
(2) Diode brazed on epoxy circuit (PCB)
(3) - XX digits for package
- 06 = SMD4 and - 20 = SMD6

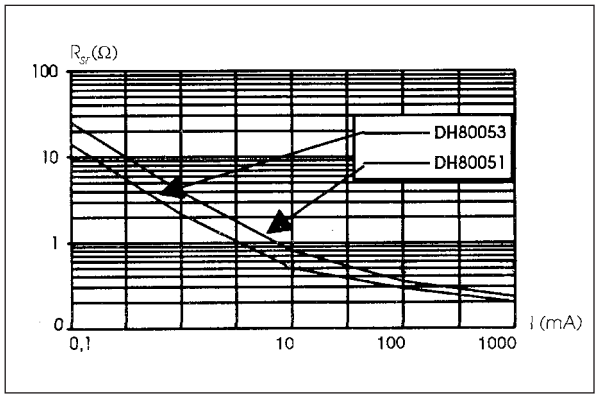
Temperature ranges:

Operating Junction (T_j) : -55° C to +175° C
Storage : -65° C to +125° C

Series Resistance vs. Forward Current



Series Resistance vs. Forward Current



NON MAGNETIC SQUARE CERAMIC PACKAGE 500 VOLTS PIN DIODES

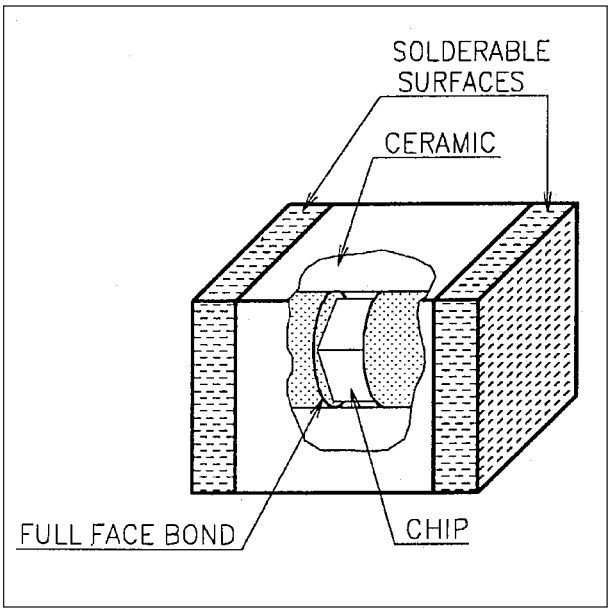
Features

- Non magnetic package
- Low loss, low distortion
- Low inductance
- High reliability
- Hermetically sealed package
- Glass passivated PIN diode chip
- Non rolling MELF design
- Pick and place compatibility

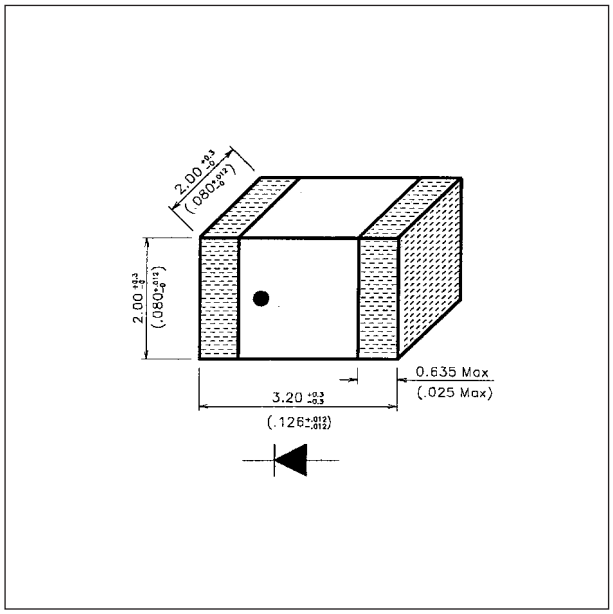
Description

TEKELEC TEMEX is manufacturing a non magnetic square PIN diode for surface mount applications. The properties of non magnetism prevent interference in the magnetic field of the imaging system. The chip inside is passivated to ensure high reliability and very low leakage. These diodes ensure high power switching at frequencies from 1 MHz to several GHz. This package utilizes ceramic package technology with low inductance and axial terminations. The design simplifies automatic pick and place indexing and assembly. The termination contacts are tin plated for vapor or reflow circuit board soldering. The active area is a PIN high power glass passivated chip which can be designed to customer specifications.

Pinning



Outline drawing



SILICON PIN DIODES

Non magnetic square ceramic package 500 volts PIN diodes

Applications

TEKELEC TEMEX non magnetic SQP diodes are particularly suitable for Magnetic Resonance Imaging applications. The maximum operating breakdown voltage is 550 V. Several values of total capacitance are available (beginning at 0.40 pF), together with a low forward series resistance.
These devices are characterized for high power handling, low loss and low distortion (long carrier lifetime design). The electrical properties are ideal for use in RF coils which must produce a homogeneous electromagnetic field in the MRI system for frequencies from a few MHz to over 100 MHz.

Maximum ratings

OPERATING JUNCTION	STORAGE	SOLDERING
- 55° C + 175° C	- 55° C + 125° C	230° C 5 sec.

Electrical characteristics

STANDARD RATINGS - MAXIMUM LIMITS OF ELECTRICAL PARAMETERS PACKAGED DIODES								
Characteristics at 25° C	**Applicable Voltage** **V**	**Breakdown Voltage** V_{BR}	**Total Capacitance** C_T		**Forward Series Resistance** R_{SF}		**Minitory Carrier** Lifetime τ_l	**Power Dissipation**
Test Conditions	I_R < 10 µa	I_r < 10 µa	f = 1 MHz V_R = 50 V		f = 120 MHz I_F as below		I_F = 10 mA I_R = 6 mA	**Contact Surface** (1)
TYPE	**V**	**V**	**pF**		**Ω max**		**µs**	**W**
	max	typ.	typ.	max	I_F=100mA	I_F=200mA	min	max
DH80050-40	500	550	0.40	0.45	0.70	0.65	1.1	3.0
DH80051-40	500	550	0.55	0.65	0.60	0.55	1.5	3.5
DH80052-40	500	550	0.85	1.05	0.40	0.35	2.0	4.0
DH80053-40	500	550	1.05	1.20	0.35	0.30	2.5	4.0
DH80054-40	500	550	1.25	1.35	0.30	0.27	3.0	4.5
DH80055-40	500	550	1.45	1.55	0.25	0.22	3.5	4.5

(1) diode brazed on infinite copper heat sink

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HIGH VOLTAGE PIN DIODES

Applications

These devices are most often used to control Radio Frequency (RF) and microwave signals. Typically, high-voltage PIN diodes are found in high power switches and phase shifters.

TEKELEC TEMEX's high-voltage PIN diode products are designed for very high reliability, high power handling capabilities, high isolation, and low signal distortion, especially in the HF and VHF bands. High-power multithrow switch modules are available for frequencies in the 1 MHz to 1 GHz range.

All high-voltage PIN diode products can be configured on chips or in various packages: e.g. series, shunt, flat mount, stud mount, surface mount (SMD) and (on request) non-magnetic.

Characteristics

The controlling element of a PIN diode is its Intrinsic (I) layer. The diode itself is a sandwich, i.e. a high resistivity I layer between highly doped layers of P and N materials. With negative bias on the I layer, the PIN diode exhibits very high parallel resistance, e.g. acting as a switch in the OFF position. A positive bias causes the diode to conduct, with very low series resistance. Certain applications impose specific objectives on diode construction (e.g. in the HF and VHF band, low signal distortion can be achieved with high Minority Carrier Lifetime τ_I).

Silicon PIN diodes for switching & phase shifting applications (medium & high power)

Description

This series of high power, high voltage PIN diodes incorporates ceramic-glass passivated mesa technology. A broad range of products is available, in terms of breakdown voltages, junction capacitances, and series resistances, to suit a large variety of applications, from 1 MHz to several GHz. These diodes are available in non-magnetic packages.

Electrical characteristics

CHIP DIODES					CHIP AND PACKAGED DIODES				
Characteristics at 25°C	Chip Dimensions		Applicable Voltage V_R	Break-down V_{BR}	Junction Capacitance C_j (1)		Forward Series Resistance R_{SF}		Minitory Carrier Lifetime τ_l
Test Conditions	N/A		I<10µA	I<10µA	V_R = 50 V f = 1 MHz		f=120 MHz I_F AS SHOWN		I_F=10mA I_R=6mA
TYPE	µm typ.		V	V	pF		Ω MAX		µs
PIN	Gold dia	per side	min	typ.	typ.	max	I_F = 100 mA	I_F = 200 mA	min
EH80050	0.13	0.6	500	550	0.15	0.20	0.70	0.65	1.1
EH80051	0.15	0.6	500	550	0.30	0.40	0.60	0.55	1.5
EH80052	0.25	0.8	500	550	0.60	0.70	0.40	0.30	2.0
EH80053	0.27	0.8	500	550	0.80	0.90	0.30	0.25	2.5
EH80055	0.34	0.9	500	550	1.2	1.3	0.25	0.22	3.0
EH80080	0.13	0.8	800	850	0.15	0.20	0.80	0.70	2.0
EH80083	0.27	0.9	800	850	0.80	0.90	0.40	0.30	3.0
EH80086	0.55	1.4	800	850	1.4	1.7	0.35	0.28	5.0
EH80100	0.23	0.9	1000	1100	0.30	0.40	0.70	0.60	3.0
EH80102	0.30	0.9	1000	1100	0.60	0.75	0.40	0.35	4.0
EH80106	0.55	1.4	1000	1100	1.40	1.70	0.35	0.30	7.0
					V_R = 100V		I_F = 200 mA	I_F = 300 mA	
EH80120	0.25	0.9	1200	1300	0.30	0.40	0.60	0.55	6.0
EH80124	0.65	1.5 H (2)	1200	1300	1.00	1.20	0.45	0.35	10.0
EH80126	0.75	1.7 H (2)	1200	1300	1.40	1.70	0.40	0.30	12.0
EH80129	1.25	2.2	1200	1300	2.00	2.30	0.30	0.25	15.0
EH80154	0.65	1.5	1500	1600	1.00	1.20	0.45	0.35	10.0
EH80159	1.25	2.2	1500	1600	2.00	2.30	0.30	0.25	15.0
					V_R = 200V		I_F = 200 mA	I_F = 300 mA	
EH80182	0.75	1.5	1800	1900	0.60	0.80	0.60	0.50	12.0
EH80189	1.4	2.6 H (2)	1800	1900	2.00	2.40	0.35	0.30	18.0
EH80204	0.85	1.7	2000	2100	1.00	1.30	0.50	0.40	14.0
EH80209	1.4	2.6 H (2)	2000	2100	2.00	2.40	0.35	0.30	18.0
EH80210	1.5	3 H (2)	2000	2100	3.00	3.40	0.20	0.15	25.0

(1) Other capacitance values available on request
(2) Hexagonal chips (between opposite flats)

	PACKAGED DIODES					
TYPE	**STANDARD CASE (3)**			**THERMAL RESISTANCE R_{TH} (4)** P_{DISS} = 1 W	**TYPICAL OPERATING CONDITIONS** VSWR < 1.5 Z_0 = 50 Ω CHIP CONFIGURATION	
				°C/W	FREQUENCY	POWER
PIN	**Shunt**	**Isolated stud**	**Flat mounted**	**max**	**MHz**	**W**
DH80050	F 27d	BH301	BH202	20.0	50 - 20000	50
DH80051	F 27d	BH301	BH202	18.0	30 - 15000	80
DH80052	F 27d	BH301	BH202	15.0	20 - 10000	100
DH80053	F 27d	BH301	BH202	12.0	20 - 3000	100
DH80055	F 27d	BH301	BH202	10.0	10 - 1000	250
DH80080	F 27d	BH301	BH202	18.0	50 - 20000	60
DH80083	F 27d	BH301	BH202	12.0	20 - 10000	80
DH80086	BH35	BH301	BH202	8.0	10 - 500	200
DH80100	F 27d	BH301	BH202	15.0	20 - 10000	80
DH80102	F 27d	BH301	BH202	12.0	20 - 3000	100
DH80106	BH35	BH300	BH202	5.5	10 - 500	500
DH80120	F 27d	BH301	BH202	15.0	10 - 8000	100
DH80124	BH35	BH300	BH200	8.0	10 - 2000	250
DH80126	BH35	BH300	BH200	6.0	10 - 500	500
DH80129	BH141	BH300	BH200	4.5	5 - 200	1000
DH80154	BH141	BH300	BH200	8.0	10 - 2000	250
DH80159	BH141	BH300	BH200	4.5	5 - 200	1000
DH80182	BH35	BH300	BH200	10	10 - 50	
DH80189	BH141	BH300	BH200	4.5	15 - 200	1000
DH80204	BH141	BH300	BH200	8.0	10 - 1000	250
DH80209	BH141	BH300	BH200	4.5	1.5 - 200	1000
DH80210	BH141	BH300	BH200	2.5	1.5 - 50	1000

(3)Custom cases available on request (4) R_{TH} is measured in a standard shunt case, grounded on an infinite heatsink

Temperature ranges: Operating junction (T_j): -55° C to +175° C Storage: -65° C to +200° C

Two & three port RF PIN switch modules

Description

This series of SP2T and SP3T RF switches uses high voltage PIN diodes, from the EH80000 family, to achieve very low loss and distortion.

Theses switches can be used from 1.5 to 1000 MHz, and can handle power levels up to 1000 W.

Electrical characteristics

CHARACTERISTICS AT 25°C			FREQUENCY RANGE	LOSS L	ISOLATION I	INPUT POWER P_{in}	SUGGESTED BIAS CONDITIONS	
TEST CONDITIONS			N/A	f (MHz) I_F (mA)	f (MHz) V_R (V)	CW	FORWARD	REVERSE
Type	Case	Switch Type	MHz	dB	dB	W	mA	V
(1)		(2)	typ.	max	min	max	typ.	typ.
				200 MHz 100 mA	**100 MHz 0 V**			
SH90101	TO39	SP2T	10 - 600	0.35	35	10	100	50
SH91101	TO39	SP2T	10 - 600	0.35	35	10	100	50
				400 MHz 100 mA	**200 MHz 0 V**			
SH90103	BH203	SP2T	20 - 1000	0.35	25	100	200	150
SH91103	BH203	SP2T	20 - 1000	0.35	25	100	200	150
SH92103	BH204	SP3T	20 - 1000	0.35	25	100	200	150
SH93103	BH204	SP3T	20 - 1000	0.35	25	100	200	150
				100 MHz 200 mA	**200 mA 100 V**			
SH91107	BH403a	SP2T	20 - 500	0.20	33	1000	400	600
				10 MHz 200 mA	**10 MHz 200 V**			
SH90207	BH405	SP2T	1.5 - 50	0.15	37	1000	1000	700
SH91207	BH405	SP2T	1.5 - 50	0.15	37	1000	1000	700

(1) Series 90 and 92 : common anode
Series 91 and 93 : common cathode

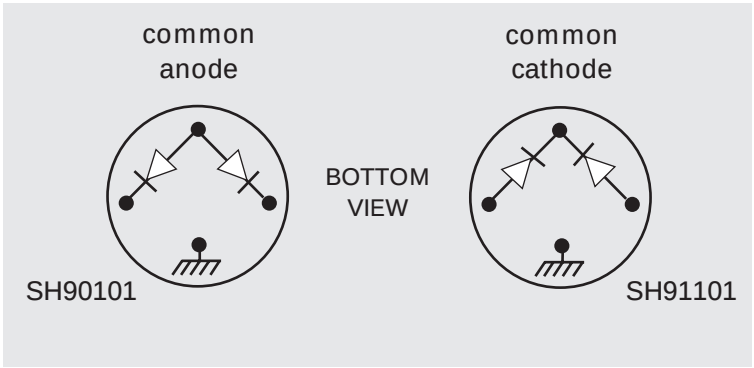
(2) Custom configurations available on request

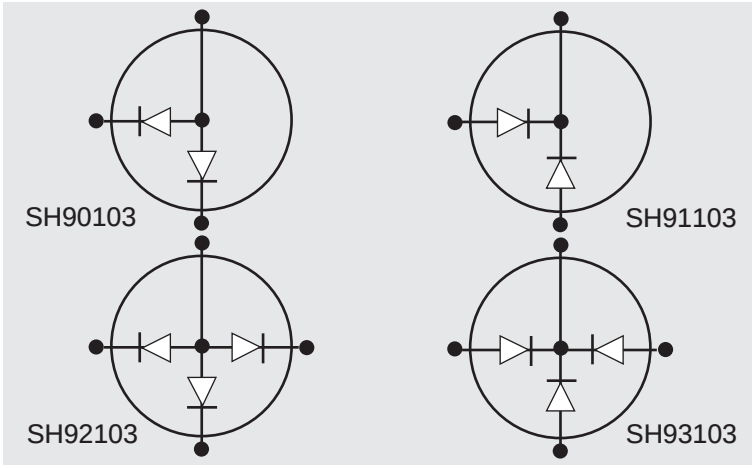
Temperature ranges:

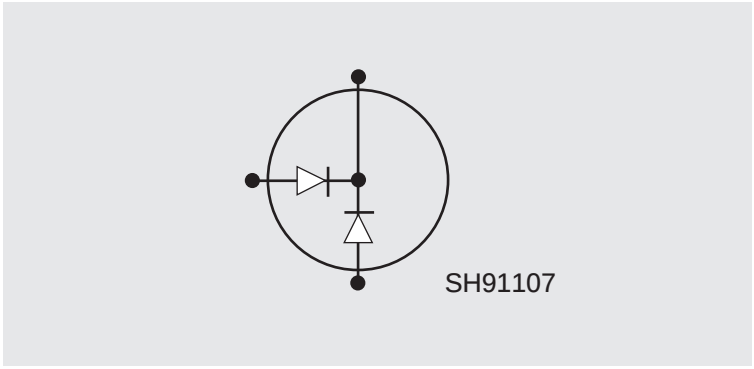
Operating juction (T_j) : - 55° C to + 150° C

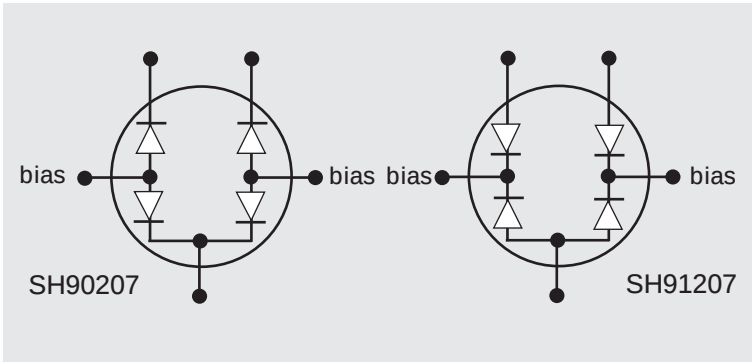
Storage : - 65° C to + 175° C

Internal wiring diagrams



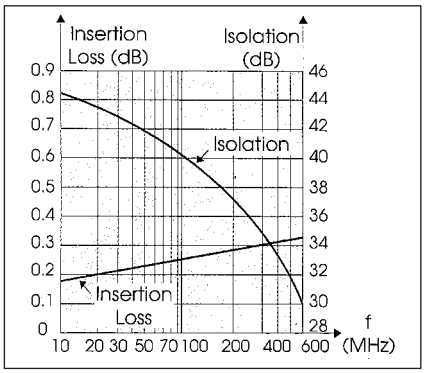


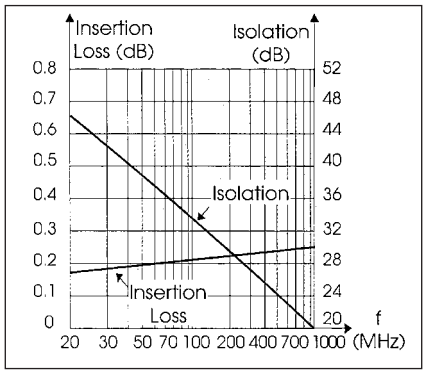


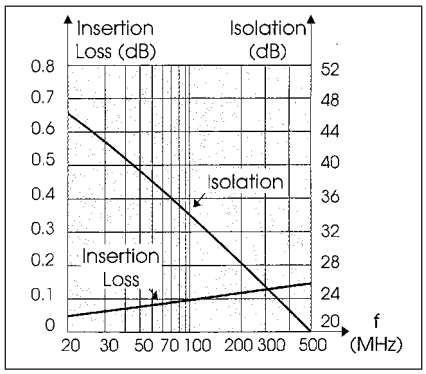


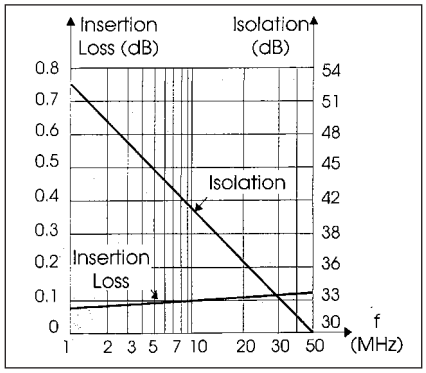
Typical performances

INSERTION LOSS AND ISOLATION VERSUS FREQUENCY









MICROWAVE APPLICATIONS

Low and medium voltage PIN diode applications

The most common uses of these devices are: fast switching, attenuation and limiting. They operate at frequencies from a few MHz to 100 GHz.

In switching applications, e.g. timing digital bit streams, these PIN diodes support signal power levels below 30 W, up to 100 GHz. Thin I layers, from 1 to 50 µm, and passivated mesa technology in chip configurations, yield very low junction capacitance (C_j), i.e. below 0.025 pF.

As attenuators, e.g. in Automatic Gain Control (AGC) circuits, these PIN diodes are manufactured with a proprietary technology. This technology optimises the relationship between C_j and R_{SF} (Forward Series Resistance), offering a high Minority Carrier Lifetime τ_l, which minimises signal distortion.

In limiting applications, e.g. passive protection for receivers, these PIN diodes operate as power dependent variable resistors.

Ultrafast switching silicon PIN diodes

Description

For ultrafast switching, these passivated mesa diodes have a thin I layer (< 10 µm).

Electrical characteristics

CHIP DIODES	CHIP AND PACKAGED DIODES							PACKAGED DIODES			
Characteristics at 25°C	Gold Dia	Breakdown Voltage	Junction Capacitance		Series Resistance	Minority Carrier Lifetime	Reverse Switching Time				Thermal Resistance
	Ø	V_{BR}	C_j		R_{SF}	τ_I	T_{CR}				R_{th}
TEST CONDITIONS		I_R = 10 µA	V_R = 6 V f = 1 MHz		I_F = 10 mA f = 120 MHz	I_F = 10 mA I_R = 6 mA	I_F = 20 mA V_R = 10 V 50 Ω				P_{diss} 1 W F 27 d
TYPE	µm	V	pF		Ω	ns	ns	TYPE	STANDARD CASES (1)		°C/W
Case C2a (1)	typ.	min	typ.	max	max	typ.	typ.		C_b = 0.18 pF (2)	C_b = 0.12 pF (2)	max
EH50033	25	30	0.08	0.12	1.8	20	2.0	DH50033	F27d	M208	80
EH50034	30	30	0.12	0.17	1.5	20	2.0	DH50034	F27d	M208	80
EH50035	35	30	0.17	0.23	1.0	25	2.5	DH50035	F27d	M208	70
EH50036	55	30	0.23	0.40	0.9	30	3.0	DH50036	F27d	M208	60
EH50037	65	30	0.40	0.60	0.7	40	4.0	DH50037	F27d	M208	50
EH50052	30	50	0.06	0.08	1.6	30	3.0	DH50052	F27d	M208	80
EH50053	35	50	0.08	0.12	1.4	30	3.0	DH50053	F27d	M208	70
EH50054	40	50	0.12	0.17	1.1	35	4.0	DH50054	F27d	M208	60
EH50055	50	50	0.17	0.23	1.0	40	4.0	DH50055	F27d	M208	50
EH50056	65	50	0.23	0.40	0.9	50	5.0	DH50056	F27d	M208	45
EH50057	80	50	0.40	0.60	0.7	60	6.0	DH50057	F27d	M208	45
EH50071	35	70	0.04	0.06	2.0	50	5.0	DH50071	F27d	M208	70
EH50072	40	70	0.06	0.08	1.7	50	5.0	DH50072	F27d	M208	70
EH50073	45	70	0.08	0.12	1.6	60	6.0	DH50073	F27d	M208	60
EH50074	50	70	0.12	0.17	1.4	60	6.0	DH50074	F27d	M208	50
EH50075	60	70	0.17	0.23	1.0	100	10.0	DH50075	F27d	M208	45
EH50076	80	70	0.23	0.40	0.9	100	10.0	DH50076	F27d	M208	40
EH50077	100	70	0.40	0.60	0.7	150	15.0	DH50077	F27d	M208	40
EH50101	45	100	0.04	0.06	1.9	150	15.0	DH50101	F27d	M208	60
EH50102	50	100	0.06	0.08	1.7	150	15.0	DH50102	F27d	M208	60
EH50103	60	100	0.08	0.12	1.4	200	20.0	DH50103	F27d	M208	55
EH50104	70	100	0.12	0.17	1.2	250	25.0	DH50104	F27d	M208	50
EH50105	90	100	0.17	0.23	1.0	300	30.0	DH50105	F27d	M208	40
EH50106	110	100	0.23	0.40	0.8	400	40.0	DH50106	F27d	M208	35
EH50107	130	100	0.40	0.60	0.6	500	50.0	DH50107	F27d	M208	35

(1) Custom cases available on request

(2) $C_T = C_j + C_b$

Temperature ranges:

Operating Junction (T_j) : -55° C to +175° C

Storage : -65° C to +200° C

Fast switching silicon PIN diodes

Description

For fast switching, these passivated mesa diodes have a medium I layer (< 50 µm).

Electrical characteristics

CHIP DIODES		CHIP AND PACKAGED DIODES						PACKAGED DIODES			
Characteristics at 25°C	Gold Dia	Breakdown Voltage	Junction Capacitance		Series Resistance	Minority Carrier Lifetime	Reverse Switching Time				Thermal Resistance
	Ø	V_{BR}	C_j		R_{SF}	τ_I	T_{CR}				R_{th}
TEST CONDITIONS		I_R = 10 µA	V_R = 50 V f = 1 MHz		I_F = 10 mA f = 120 MHz	I_F = 10 mA I_R = 6 mA	I_F = 20 mA V_R = 10 V 50 Ω				P_{diss} 1 W F27 d
TYPE	µm	V	pF		Ω	ns	ns	TYPE	STANDARD CASES (2)		°C/W
Case C2a (1)	typ.	min	typ.	max	max	typ.	typ.		C_b = 0.18 pF (2)	C_b = 0.12 pF (2)	max
EH50151	55	150	0.04	0.06	2.0	200	20	DH50151	F27d	M208	50
EH50152	60	150	0.06	0.08	1.7	230	23	DH50152	F27d	M208	50
EH50153	70	150	0.08	0.12	1.5	300	30	DH50153	F27d	M208	45
EH50154	90	150	0.12	0.17	1.4	500	50	DH50154	F27d	M208	40
EH50155	110	150	0.17	0.23	1.0	550	55	DH50155	F27d	M208	35
EH50156	130	150	0.23	0.40	0.8	800	80	DH50156	F27d	M208	30
EH50157	150	150	0.40	0.60	0.6	950	95	DH50157	F27d	M208	30
EH50201	60	200	0.04	0.06	2.3	300	30	DH50201	F27d	M208	45
EH50202	65	200	0.06	0.08	2.1	400	40	DH50202	F27d	M208	45
EH50203	75	200	0.08	0.12	1.5	500	50	DH50203	F27d	M208	40
EH50204	100	200	0.12	0.17	1.3	650	65	DH50204	F27d	M208	35
EH50205	120	200	0.17	0.23	1.0	800	80	DH50205	F27d	M208	30
EH50206	150	200	0.23	0.40	0.8	950	95	DH50206	F27d	M208	30
EH50207	170	200	0.40	0.60	0.7	1050	100	DH50207	F27d	M208	25
EH50251	65	250	0.04	0.06	2.4	330	33	DH50251	F27d	M208	40
EH50252	75	250	0.06	0.08	2.2	500	50	DH50252	F27d	M208	40
EH50253	100	250	0.08	0.12	2.0	900	90	DH50253	F27d	M208	35
EH50254	130	250	0.12	0.17	1.4	900	90	DH50254	F27d	M208	30
EH50255	160	250	0.17	0.23	0.9	1000	100	DH50255	F27d	M208	30
EH50256	180	250	0.23	0.40	0.8	1150	110	DH50256	F27d	BH142	25
EH50401	80	400	0.04	0.06	2.5	700	70	DH50401	F27d	M208	35
EH50402	90	400	0.06	0.08	2.3	800	80	DH50402	F27d	M208	35
EH50403	120	400	0.08	0.12	2.1	1000	100	DH50403	F27d	M208	30
EH50404	150	400	0.12	0.17	1.8	1500	150	DH50404	F27d	BH142	25
EH50405	200	400	0.17	0.23	1.6	2000	200	DH50405	F27d	BH142	20

(1) Chip presentation C2a, except:
C2b forEH50256, EH50404 and EH50405

(2) Custom cases available on request

(3) $C_T = C_j + C_b$

Temperature ranges:

Operating junction (T_j) : -55° C to +175° C

Storage : -65° C to +200° C

Attenuator silicon PIN diodes

Description

The table below presents a single set of values from the variety of customer options available for this series of passivated PIN diodes. TEKELEC TEMEX uses its proprietary technology, which enables the customer to incorporate characteristics specific to the application involved, e.g. capacitance and I zone thickness. Typical applications include variable RF attenuators and AGC (Automatic Gain Control) circuits, from a few MHz to several GHz.

Electrical characteristics

CHIP DIODES		CHIP AND PACKAGED DIODES												PACKAGED DIODES	
Charact. at 25°C	CONFIGURATION	I Zone Thickness (1)	Series Resistance R_{SF}						Junction Capacitance C_J (2)		Reverse Current I_R	Minority Carrier Lifetime τ_I			
Test Conditions			F = 120 MHz						F = 1 MHz V_R = 50 V		V_R = 100 V	I_F = 10 mA I_R = 6 mA			
Type		µm	I_F = 0.1 mA Ω		I_F = 1 mA Ω		I_F = 10 mA Ω		pF		µA	µs		Type	Standard Package (3)
		typ.	min	max	min	max	min	max	typ.	max	max	min	typ.		
EH40073	C4c	70	70	140	8	16	1.0	2.0	0.30	0.50	10	1.5	2.0	DH40073	F 27d
EH40141	C4a	140	400	800	50	100	6.5	13.0	0.05	0.10	10	1.5	2.5	DH40141	F 27d
EH40144	C4c	140	200	400	25	50	3.5	7.0	0.10	0.30	10	4.0	5.0	DH40144	F 27d
EH40225	C4d	220	400	800	50	100	6.5	13.0	0.10	0.30	10	5.5	7.0	DH40225	F 27d

(1) Other I zone thicknesses available on request

(2) Other capacitance values available on request

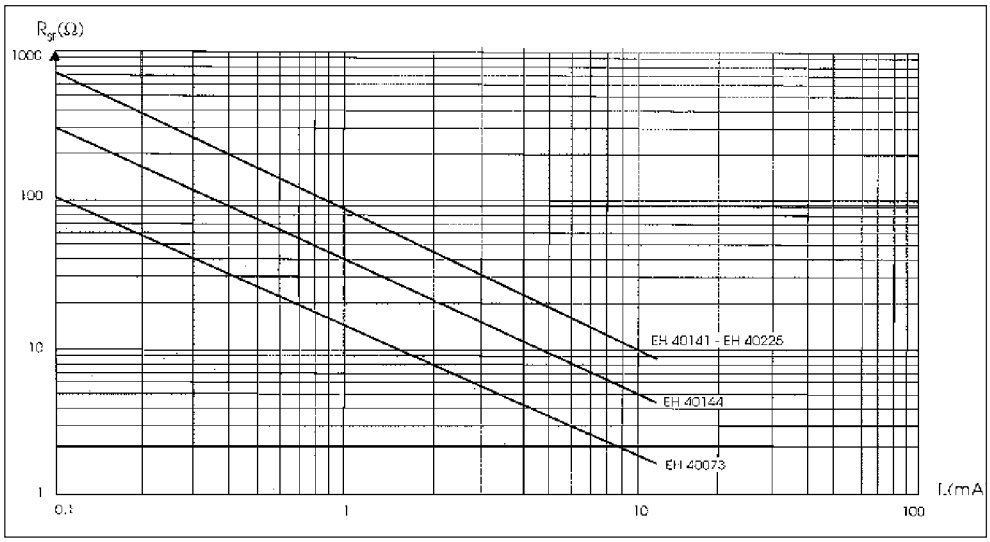
(3) Custom cases available on request

Temperature ranges:

Operating junction (T_j) : -55° C to +175° C

Storage : -65° C to +200° C

Typical series resistance vs forward current



Silicon limiter PIN diodes

Description

These passivated mesa PIN diodes have a thin I layer. This series of diodes is available as chips and in hermetic ceramic packages. They operate as power dependent variable resistances and provide passive receiver protection (low noise amplifiers, mixers, and detectors).

Electrical characteristics

CHIP DIODES			PACKAGED DIODES						
CHARACTERISTICS AT 25°C		GOLD DIA Ø	BREAKDOWN VOLTAGE V_{BR}		JUNCTION CAPACITANCE C_{j0}	JUNCTION CAPACITANCE $C_{j^{-6}}$ (1)		SERIES RESISTANCE R_{SF}	MINORITY CARRIER LIFETIME τ_I
TEST CONDITIONS			I_R=10µA		V_R=0 V f = 1 MHz	V_R=6 V f = 1 MHz		I_F=10mA f=120 MHz	I_F=10mA I_R = 6 mA
TYPE	CASE	µm	V		pF	pF		Ω	ns
		typ.	min	max	typ.	min	max	max	typ.
EH60033	C2a	25	25	50	0.14	0.08	0.12	1.8	20
EH60034	C2a	30	25	50	0.20	0.12	0.17	1.5	20
EH60035	C2a	35	25	50	0.28	0.17	0.23	1.0	25
EH60036	C2a	55	25	50	0.45	0.23	0.40	0.9	30
EH60037	C2a	65	25	50	0.70	0.40	0.60	0.7	40
EH60052	C2a	30	50	70	0.10	0.06	0.08	1.8	30
EH60053	C2a	35	50	70	0.14	0.08	0.12	1.4	30
EH60054	C2a	40	50	70	0.20	0.12	0.17	1.1	35
EH60055	C2a	50	50	70	0.28	0.17	0.23	1.0	40
EH60056	C2a	65	50	70	0.45	0.23	0.40	0.9	50
EH60057	C2a	80	50	70	0.70	0.40	0.60	0.8	60
EH60072	C2a	40	70	90	0.10	0.06	0.08	1.7	50
EH60074	C2a	50	70	90	0.20	0.12	0.17	1.4	60
EH60076	C2a	80	70	90	0.45	0.23	0.40	0.9	100
EH60102	C2a	50	90	120	0.10	0.06	0.08	1.7	150
EH60104	C2a	70	90	120	0.20	0.12	0.17	1.2	250
EH60106	C2a	110	90	120	0.45	0.23	0.40	0.8	400

(1) Other values of capacitance available on request

PACKAGED DIODES			NOMINAL MICROWAVE CHARACTERISTICS					
CHARACTERISTICS AT 25°C			THERMAL RESISTANCE R_{TH}	THRESHOLD P_L	LEAKAGE POWER P_{OUT}	INSERTION LOSS L	PEAK POWER P_{IN}	CW POWER P_{IN}
TEST CONDITIONS			P_{diss} = 1W case F 27d	f = 2.7 GHz 1dB Limiting	f = 2.7 GHz	f = 2.7 GHz P_{IN} = -10 dBm	1 µs Pulse 1% DC	
TYPE	STANDARD CASE (2)		°C/W	dBm	dBm	dB	dBm	W
	C_b = 0.18 pF (3)	C_b = 0.12 pF (3)	max	typ.	typ.	typ.	max	max
DH60033	F 27d	M208	80	+ 10	+ 20	0.1	+ 50	2.0
DH60034	F 27d	M208	80	+ 10	+ 20	0.1	+ 50	2.0
DH60035	F 27d	M208	70	+ 10	+ 21	0.1	+ 52	2.5
DH60036	F 27d	M208	60	+ 10	+ 22	0.2	+ 53	3.0
DH60037	F 27d	M208	50	+ 10	+ 23	0.2	+ 56	4.0
DH60052	F 27d	M208	80	+ 15	+ 24	0.1	+ 52	2.5
DH60053	F 27d	M208	70	+ 15	+ 24	0.1	+ 52	2.5
DH60054	F 27d	M208	60	+ 15	+ 25	0.1	+ 53	3.0
DH60055	F 27d	M208	50	+ 15	+ 26	0.1	+ 54	3.5
DH60056	F 27d	M208	45	+ 15	+ 27	0.2	+ 57	4.0
DH60057	F 27d	M208	45	+ 15	+ 28	0.2	+ 58	5.0
DH60072	F 27d	M208	70	+ 18	+ 27	0.1	+ 54	3.0
DH60074	F 27d	M208	50	+ 18	+ 30	0.2	+ 55	4.0
DH60076	F 27d	M208	40	+ 18	+ 32	0.2	+ 58	5.0
DH60102	F 27d	M208	60	+ 20	+ 31	0.2	+ 56	3.5
DH60104	F 27d	M208	50	+ 20	+ 33	0.2	+ 59	5.0
DH60106	F 27d	M208	35	+ 20	+ 35	0.3	+ 61	7.0

(2) Other capacitance values available on request

(3) $C_T = C_j + C_b$

Temperature ranges:

Operating junction (T_j) : -55° C to +125° C

Storage : -65° C to +200° C

SILICON SCHOTTKY DIODES

Selection Guide

SCHOTTKY BARRIER DETECTOR DIODES

SCHOTTKY BARRIER MIXER DIODES

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SILICON SCHOTTKY BARRIER DETECTOR DIODES

Description

Silicon Schottky barrier detector diodes are available as:

- packaged diodes
- chip

They are optimised for wide band applications, in the frequency range from 1 to 18 GHz.

Electrical characteristics packaged diodes

CHARACTERISTICS AT 25°C		FREQUENCY RANGE F_{oper}	TANGENTIAL SENSITIVITY T_{SS}	VIDEO RESISTANCE R_V		RF POWER P_{RF}	FORWARD CONTINUOUS CURRENT I_F	BREAKDOWN VOLTAGE V_{BR}
TEST CONDITIONS		N/A	Video bandwidth = 1 MHz I_F = 30 µA			CW	N/A	I_R = 10 µA
TYPE	CASE (1)	GHz	dBm	kΩ		mW	mA	V
			min	min	max	max	max	typ.
DH340	F51	2 - 12 12 - 18	- 54 - 51	1	2	250	50	3

(1) Custom cases available on request

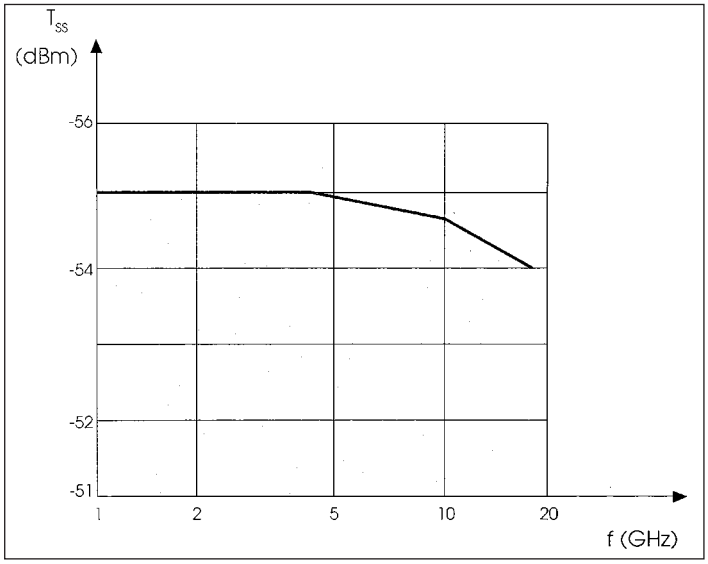
Temperature ranges:

Operating junction (T_j) : -55° C to +150° C

Storage : -65° C to +175° C

- T = + 25° C
- I_F = 30 µA
- Video bandwidth = 1 MHz

Typical tangential sensitivity vs frequency



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SILICON SCHOTTKY BARRIER MIXER DIODES

Description

Silicon Schottky barrier mixer diodes are available in the following configurations:

- packaged
- chip

Low barrier diodes are required for applications where the Local Oscillator (LO) drive level is between -10 dBm and +10 dBm. Medium barrier diodes are required for applications where the LO drive level is between -5 dBm and +15 dBm. The use of a passivated planar construction contributes to high reliability.

Electrical characteristics packaged diodes

CHARACTERISTICS AT 25°C		FREQUENCY RANGE F_{oper}	SSB NOISE FIGURE NF_{SSB}	VSWR (RATIO)		IF IMPEDANCE Z_{IF}		TEST PULSE ENERGY	BREAKDOWN VOLTAGE V_{BR}	TOTAL CAPACITANCE C_{TO}
TEST CONDITIONS		N/A	(1)	N/A		f = 30 MHz P_{LO} = 1 mW		PULSE = 3 ns	I_R = 10 µA	F = 1 MHz V_R = 0 V
TYPE	CASE (2)	GHz	dB	ratio		Ω		Ergs	V	pF
			max	typ.	max	min	max	max	typ.	typ.
DH301	F51	1 - 6	6.5	1.5	2	200	400	5	3	0.40
DH302	F51	1 - 6	6.0	1.5	2	200	400	5	3	0.40
DH303	F51	1 - 6	5.5	1.5	2	200	400	5	3	0.40
DH312	F51	6 - 12	7.0	1.5	2	200	400	5	3	0.25
DH313	F51	6 - 12	6.5	1.5	2	200	400	5	3	0.25
DH314	F51	6 - 12	6.0	1.5	2	200	400	5	3	0.25
DH315	F51	6 - 12	5.5	1.5	2	200	400	5	3	0.25
DH322	F51	12 - 18	7.5	1.5	2	200	400	5	3	0.17
DH323	F51	12 - 18	7.0	1.5	2	200	400	5	3	0.17
DH324	F51	12 - 18	6.5	1.5	2	200	400	5	3	0.17
DH325	F51	12 - 18	6.0	1.5	2	200	400	5	3	0.17

RF Power max: 250 mW CW

Temperature ranges:

Operating junction (T_j) : -55° C to +150° C

Storage : -65° C to +175° C

(1) Noise figure measurement conditions:
P_{LO} = 1 mW
f_{IF} = 30 MHz
NF_{IF} = 1.5 dB
noise tube: 15.6 dB
dc load = 10 Ω
test frequencies: 3.0, 9.3 or 15.0 GHz

(2) Custom cases available on request

TUNING VARACTOR

Selection Guide

SURFACE MOUNT SILICON ABRUPT TUNING VARACTOR

HIGH Q SILICON ABRUPT JUNCTION TUNING VARACTOR

- V_{BR} = 30 V

- V_{BR} = 45 V

SILICON HYPERABRUPT JUNCTION TUNING VARACTOR

MICROWAVE SILICON HYPERABRUPT JUNCTION TUNING VARACTO

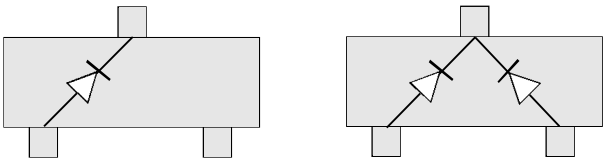
A tuning varactor is a P-N diode that acts as a voltage controlled capacitor. These devices perform the same function as the familiar, bulky, air dielectric stacked capacitors featured in traditional broadcast band receivers.

SOT23 surface mount silicon abrupt tuning varactor

Features

- High quality factor
- Low leakage current
- Passivated silicon mesa technology
- Surface mount package
- Tape and reel packaging available

Outline drawing



-51 -53

(Top view)

Nota: Other plastic packages available.

Description

TEKELEC TEMEX silicon abrupt tuning varactors have an epitaxial mesa design with a high temperature passivation. This technology is used to produce abrupt tuning varactor in SOT23 package. This family is designed for a low cost medium to high volume market that may be supplied in tape and reel for automated pick and place assembly on surface mount circuit boards.

Applications

The DH71000 series abrupt tuning varactor are offered in a large selection of capacitance range. They provide the highest Q factor (low reverse series resistance) available for a 30 volts silicon device.

Typical applications include low noise narrow and moderate frequency bandwidth applications (VCO mainly) from HF to Microwave frequencies (up to 3 GHz).

Other applications are voltage tuned filters, phase shifters, delay lines ....

NOTE: Variation of the junction capacitance versus reverse voltage follows this equation:

$$C_j(V_r) = \frac{C_j(0\ V)}{\left[1 + \frac{V_r}{\phi}\right]^{\gamma}}$$

V_r : Reverse voltage
ϕ : Built-in potential .7V for Si
γ : .5 for abrupt tuning varactor

Electrical characteristics at 25° C

Electrical Parameters	Breakdown Voltage V_{BR}	Junction Capacitance C_j (1) (2)	Tuning Ratio	Figure of Merite Q
Test Conditions	I_R = 10 µA	F = 1 MHz V_R = 4 V	C_{j0}/C_{j30}	V_R = 4 V F = 50 MHz
Type (3)	V	pF	typ.	typ.
	min	± 20 %		
DH71010-XX	30	1	4	4300
DH71016-XX	30	1.6	4.5	4100
DH71020-XX	30	2	4.6	3900
DH71030-XX	30	3	4.7	3400
DH71045-XX	30	4.5	4.8	3000
DH71067-XX	30	6.7	4.9	2600
DH71100-XX	30	10	5	2200

(1) Other tolerance on request

(2) DH71067-XX & DH71100-XX: Tolerance on C_j ± 10 %

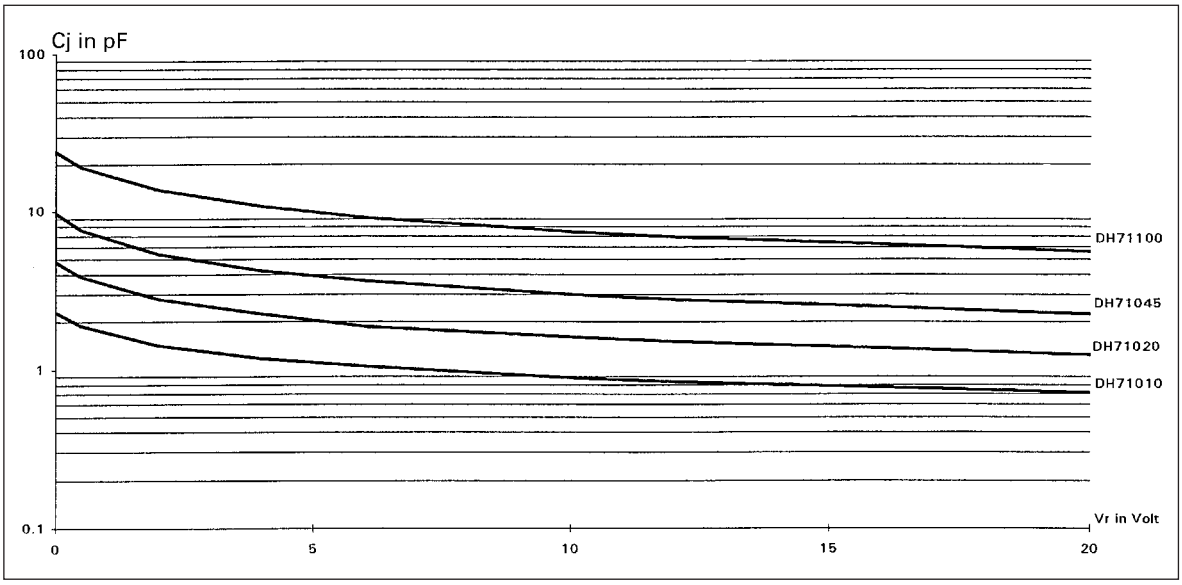
(3) -XX digits for internal electrical configuration

Temperature ranges:

Operating junction (T_j) : -55° C to +150° C

Storage : -65° C to +150° C

Typical performance curve



HIGH Q SILICON ABRUPT JUNCTION TUNING VARACTOR

V_{BR} 30 V

Description

This series of high Q epi-junction microwave tuning varactors (30 V) incorporates a passivated mesa technology. It is well suited for frequency tuning applications up to Ku band.

CHIP DIODES			CHIP AND PACKAGED DIODES		PACKAGED DIODES (1)				
			V_{BR} (10 µA) ≥ 30 V		STANDARD CASES			OTHER CASES	
CHARACTERISTICS AT 25°C		GOLD DIA Ø	Junction Capacitance C_j	FIG. OF Merit Q			Tuning Ratio C_{TO}/C_{T30}		Tuning Ratio C_{TO}/C_{T30}
Test Conditions			V_R = 4 V f = 1 MHz	V_R = 4 V f = 50 MHz		CASE CAPACITANCE C_b		CASE CAPACITANCE C_b	
TYPE	CASE	µm	pF		TYPE	CASE		CASE	
		typ.	± 20 % (2)	min		C_b= 0.18 pF (3)	min	C_b= 0.12 pF (3)	min
EH71004	C2a	50	0.4	4500	DH71004	F27d	3.0	M208	3.3
EH71006	C2a	60	0.6	4500	DH71006	F27d	3.4	M208	3.7
EH71008	C2a	70	0.8	4400	DH71008	F27d	3.7	M208	4.0
EH71010	C2a	80	1.0	4300	DH71010	F27d	4.0	M208	4.3
EH71012	C2a	90	1.2	4200	DH71012	F27d	4.3	M208	4.5
EH71016	C2a	100	1.6	4100	DH71016	F27d	4.5	M208	4.6
EH71020	C2a	110	2.0	3900	DH71020	F27d	4.6	M208	4.7
EH71025	C2a	120	2.5	3600	DH71025	F27d	4.6	M208	4.8
EH71030	C2a	140	3.0	3400	DH71030	F27d	4.7	M208	4.8
EH71037	C2a	150	3.7	3200	DH71037	F27d	4.7	M208	4.8
EH71045	C2a	170	4.5	3000	DH71045	F27d	4.8	M208	4.9
EH71054	C2a	180	5.4	2800	DH71054	F27d	4.8	M208	4.9
			± 10 % (2)			C_b= 0.18 pF (3)		C_b= 0.2 pF (3)	
EH71067	C2a	200	6.7	2600	DH71067	F27d	4.9	BH142	4.9
EH71080	C2b	220	8.0	2400	DH71080	F27d	5.0	BH142	5.0
EH71100	C2b	250	10.0	2200	DH71100	F27d	5.0	BH142	5.0
EH71120	C2b	270	12.0	2000	DH71120	F27d	5.1	BH142	5.1
EH71150	C2b	300	15.0	1800	DH71150	F27d	5.1	BH142	5.1
EH71180	C2b	330	18.0	1700	DH71180	F27d	5.2	BH142	5.2
EH71200	C2b	350	20.0	1500	DH71200	F27d	5.2	BH142	5.2
EH71220	C2b	370	22.0	1400	DH71220	F27d	5.2	BH142	5.2
EH71270	C2b	410	27.0	1300	DH71270	F27d	5.2	BH142	5.2
EH71330	C2c	450	33.0	1200	DH71330	F27d	5.2	BH142	5.2
EH71390	C2c	500	39.0	950	DH71390	F27d	5.2	BH142	5.2
EH71470	C2c	540	47.0	750	DH71470	F27d	5.2	BH142	5.2
EH71560	C2c	590	56.0	650	DH71560	F27d	5.2	BH142	5.2
EH71680	C2c	650	68.0	500	DH71680	F27d	5.2	BH142	5.2
EH71820	C2d	720	82.0	400	DH71820	F27d	5.2	BH142	5.2
EH71999	C2d	800	100.0	300	DH71999	F27d	5.2	BH142	5.2

(1) Custom cases available on request

(2) Closer capacitance tolerances available on request

(3) $C_T = C_j + C_b$

Temperature ranges:

Operating junction (T_j) : -55° C to +150° C

Storage : -65° C to +175° C

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V_{BR} 45 V

Description

This series of high Q epi-junction microwave tuning varactors (45 V) incorporates a passivated mesa technology. It is well suited for frequency tuning applications up to X band.

CHIP DIODES			CHIP AND PACKAGED DIODES		PACKAGED DIODES (1)				
			V_{BR} (10 µA) ≥ 45 V		STANDARD CASES			OTHER CASES	
CHARACTERISTICS AT 25° C		GOLD DIA Ø	Junction Capacitance C_j	FIG. OF Merit Q			Tuning Ratio C_{TO}/C_{T45}		Tuning Ratio C_{TO}/C_{T45}
Test Conditions			V_R = 4 V f = 1 MHz	V_R = 4 V f = 50 MHz		CASE CAPACITANCE C_b		CASE CAPACITANCE C_b	
TYPE	CASE	µm	pF		TYPE	CASE		CASE	
		typ.	± 20 % (2)		min	C_b = 0.18pF (3)	min	C_b = 0.12pF (3)	min
EH72004	C2a	60	0.4	3000	DH72004	F27d	3.5	M208	3.7
EH72006	C2a	80	0.6	2900	DH72006	F27d	3.9	M208	4.1
EH72008	C2a	90	0.8	2800	DH72008	F27d	4.2	M208	4.5
EH72010	C2a	110	1.0	2700	DH72010	F27d	4.5	M208	4.7
EH72012	C2a	110	1.2	2700	DH72012	F27d	4.7	M208	4.9
EH72016	C2a	120	1.6	2600	DH72016	F27d	5.0	M208	5.2
EH72020	C2a	140	2.0	2500	DH72020	F27d	5.2	M208	5.5
EH72025	C2a	150	2.5	2400	DH72025	F27d	5.4	M208	5.6
EH72030	C2a	170	3.0	2300	DH72030	F27d	5.5	M208	5.7
EH72037	C2a	190	3.7	2200	DH72037	F27d	5.6	M208	5.7
EH72045	C2a	210	4.5	2000	DH72045	F27d	5.7	M208	5.8
EH72054	C2a	230	5.4	1900	DH72054	F27d	5.8	M208	5.9
			± 10 % (2)			C_b = 0.18 pF (3)		C_b = 0.2pF (3)	
EH72067	C2b	250	6.7	1800	DH72067	F27d	5.9	BH142	6.0
EH72080	C2b	280	8.0	1700	DH72080	F27d	5.9	BH142	6.0
EH72100	C2b	310	10.0	1600	DH72100	F27d	6.0	BH142	6.0
EH72120	C2b	340	12.0	1500	DH72120	F27d	6.0	BH142	6.0
EH72150	C2b	380	15.0	1400	DH72150	F27d	6.0	BH142	6.0
EH72180	C2b	420	18.0	1300	DH72180	F27d	6.0	BH142	6.0
EH72200	C2b	440	20.0	1200	DH72200	F27d	6.0	BH142	6.0
EH72220	C2c	470	22.0	1100	DH72220	F27d	6.0	BH142	6.0
EH72270	C2c	520	27.0	1000	DH72270	F27d	6.0	BH142	6.0
EH72330	C2c	570	33.0	900	DH72330	F27d	6.0	BH142	6.0
EH72390	C2c	620	39.0	800	DH72390	F27d	6.0	BH142	6.0
			± 10 % (2)			C_b = 0.18pF (3)		C_b = 0.4pF (3)	
EH72470	C2d	680	47.0	700	DH72470	BH28	6.0	BH157	6.0
EH72560	C2d	740	56.0	600	DH72560	BH28	6.0	BH157	6.0
EH72680	C2d	820	68.0	450	DH72680	BH28	6.0	BH157	6.0
			± 10 % (2)			C_b = 0.4pF (3)		C_b = 0.4pF (3)	
EH72820	C2g	900	82.0	350	DH72820	BH141	6.0	BH157	6.0
EH72999	C2g	1000	100.0	250	DH72999	BH141	6.0	BH157	6.0

(1) Custom cases available on request

(2) Closer capacitance tolerances available on request

(3) $C_T = C_j + C_b$

Temperature ranges:

Operating junction (T_j) : -55° C to +150° C

Storage : -65° C to +175° C

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SILICON HYPERABRUPT JUNCTION TUNING VARACTOR

Description

This series of silicon tuning varactors consists of hyperabrupt epitaxial devices. They incorporate a passivated mesa technology. Packaged or chip devices are available for VHF linear electronic tuning.

CHIP DIODES			CHIP AND PACKAGED DIODES					PACKAGED DIODES	
CHARACTERISTICS AT 25°C		GOLD DIA Ø	BREAKDOWN VOLTAGE V_{BR}	TOTAL CAPACITANCE CT	FIG. OF MERIT Q	BIAS VOLTAGE V_R	TUNING RATIO C_{TO}/C_{T20}		
TEST CONDITIONS			I_R = 10 µA	f = 1 MHz V_R	f = 50 MHz V_R		f = 1 MHz		
TYPE	CASE	µm	V	pF				TYPE	STANDARD CASE (1)
		min	min	typ.	min	V	typ.		C_b = 0.18 pF
EH724	C2b	200	25	15	100	4	10	DH724	F27d
EH726	C2b	220	25	13	100	6	9	DH726	F27d
EH728	C2b	250	25	12	150	8	8	DH728	F27d
EH730	C2b	270	25	10	250	10	8	DH730	F27d
EH732	C2b	300	25	10	250	12	7	DH732	F27d

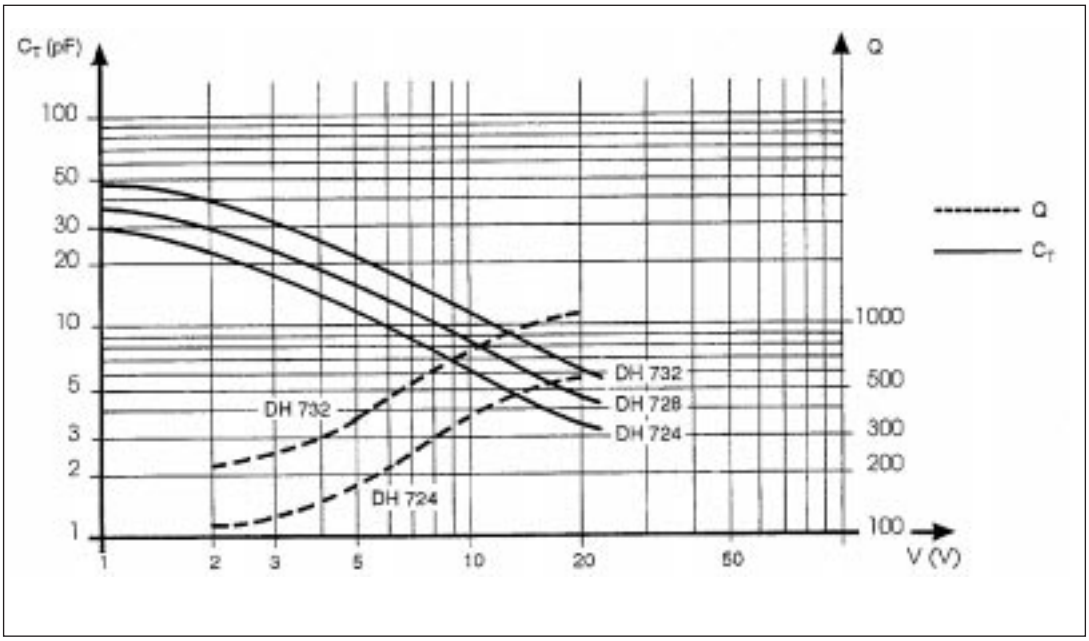
(1) Custom cases available on request

Temperature ranges:

Operating junction (T_j) : -55° C to +150° C

Storage : -65° C to +150° C

Typical total capacitance and Q versus reverse voltage



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MICROWAVE SILICON HYPERABRUPT JUNCTION TUNING VARACTOR

Description

This series of silicon tuning varactors consists of hyperabrupt epitaxial devices. They incorporate a passivated mesa technology. Packaged or chip devices are available for linear electronic tuning up to Ku band.

CHIP DIODES			CHIP AND PACKAGED DIODES					PACKAGED DIODES	
CHARACTERISTICS AT 25°C		GOLD DIA ∅	BREAKDOWN VOLTAGE V_{BR}	TOTAL CAPACITANCE C_T	FIG. OF MERIT Q	TUNING RATIO C_{TO}/C_{T20}			
TEST CONDITIONS			I_R=10 µA	f=1 MHz V_R=6 V	f=1 GHz V_R= 6 V	f=1 MHz			
TYPE	CASE	µm	V	pF			TYPE	STANDARD CASE (1)	
		min	min	typ.	typ.	min		C_b=0.18 pF	C_b=0.12 pF
EH733	C2a	60	20	0.8	180	5	DH733	F27d	M208
EH734	C2a	80	20	1.2	160	5	DH734	F27d	M208
EH735	C2a	100	20	1.8	150	5	DH735	F27d	M208
EH736	C2a	160	20	2.7	100	6	DH736	F27d	M208
EH737	C2a	180	20	3.9	85	6	DH737	F27d	M208
EH738	C2a	200	20	4.7	70	6	DH738	F27d	M208

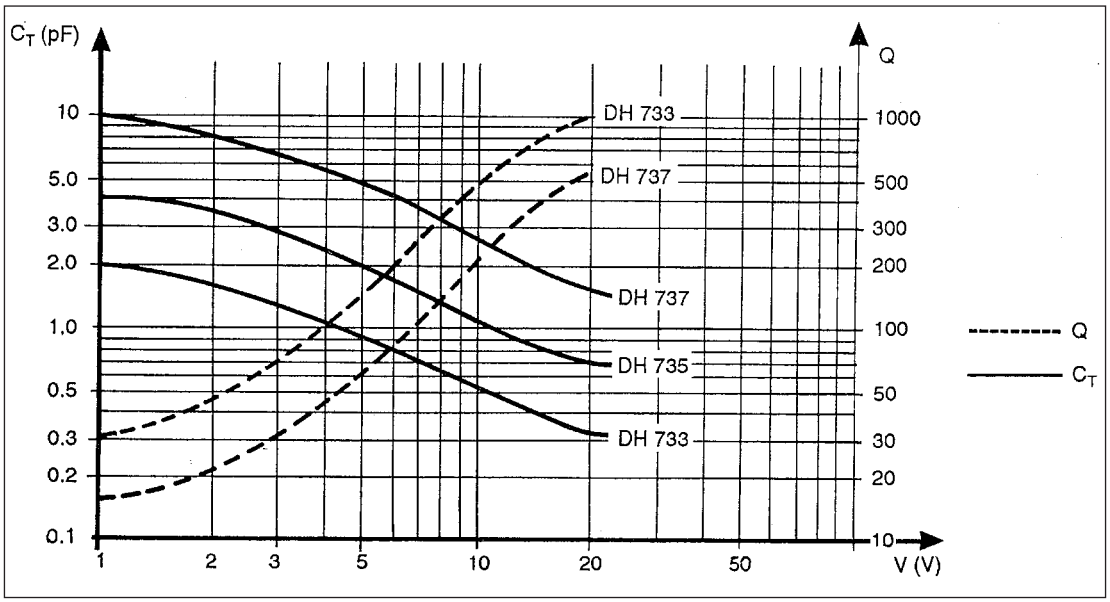
(1) Custom cases available on request

Temperature ranges:

Operating junction (T_j) : -55° C to +150° C

Storage : -65° C to +175° C

Typical total capacitance and Q versus reverse voltage



POWER GENERATION DIODES

Selection Guide

STEP RECOVERY DIODES

SILICON MULTIPLIER VARACTORS

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STEP RECOVERY DIODES AND MULTIPLIER VARACTOR APPLICATIONS

A step recovery diode (SRD) generates pulses that can be used to multiply frequencies, and to set up reference points, e.g. for synchronising test instruments.

This device operates by alternately producing and consuming a charge, based on the frequency of its input signal. During forward bias, the SRD conducts and builds up its charge. During reverse bias, the SRD maintains conduction by consuming its charge. When the charge has been fully consumed, the SRD snaps off, i.e. very quickly reverts to zero conduction.

This device acts as a switch, controlling current flow by alternately storing and releasing its charge, forming pulses at a repetition rate equal to the frequency of its input.

The output of a step recovery diode is most often used in two ways:

- a pulse train can be applied to resonant circuits, which provides output power at a frequency above that of the original input,
- a pulse train can be used to develop a series of frequencies at multiples of the original input frequencies.

Typical applications of step recovery diodes include oscillators, power transmitters and drivers, for telecommunications, telemetry, radar and test equipments.

In choosing a SRD, the significant characteristics include:

Output Frequency (f_o) ; Breakdown Voltage (V_{BR}) ; Junction Capacitance (C_j) ; Minority Carrier Lifetime (τ_l); Snap-off Time (t_{so}) ; Thermal Resistance (R_{th}) and Output Power (P_o).

Multiplier varactors

A multiplier varactor is a physical stack of series-connected SRD units. This configuration is capable of multiplying power.

Packages for multiplier varactors are designed to dissipate the power yield $\left(\frac{\text{Power out}}{\text{Power in}}\right)$

Most of these packages hold from 2 to 4 chips, this type of components are available on customer request.

STEP RECOVERY DIODES (SRD)

Description

These diodes use mesa technology and oxide passivation. They support fast switching and multiplier applications:

- very short pulse generation,
- ultra fast waveform shaping,
- comb generation,
- high order multiplication, at moderate power ratings.

CHIP DIODES			CHIP AND PACKAGED DIODES					PACKAGED DIODES				
CHARACTERISTICS AT 25°C		GOLD DIA ∅	BREAKDOWN VOLTAGE V_{BR}	JUNCTION CAPACITANCE C_j	MIN. CAR. LIFETIME τ_l	SNAP-OFF TIME t_{SO}				THERMAL RESISTANCE R_{TH}		
TEST CONDITIONS		N/A	I_R=10µA	V_R=6 V f= 1 MHz	I_F=10mA I_R= 6mA	I_F=10 mA V_R=10 V				P_{diss}=1 W in F27d		
TYPE	CASE	µm	V	pF	ns	ps		TYPE	CASE (1)	°C/W	Other cases (1)	
		typ.	min	max	min	typ.	max		C_b=0.1pF (2)	max	C_b=0.18pF (2)	C_b=0.18pF (2)
EH541	C2a	160	30	1.5	25	90	140	DH541	A22e	30	F27d	M208
EH542	C2a	220	50	1.5	40	150	250	DH542	A22e	25	F27d	M208
EH543	C2a	110	30	1.0	20	90	140	DH543	A22e	40	F27d	M208
EH544	C2a	140	50	1.0	35	150	250	DH544	A22e	35	F27d	M208
EH545	C2a	55	25	0.4	10	75	100	DH545	A22e	70	F27d	M208
EH546	C2a	40	15	0.3	6	60	80	DH546	A22e	100	F27d	M208

(1) Custom cases available on request

(2) $C_T = C_j + C_b$

Temperature ranges:

Operating junction (T_j) : -55° C to +150° C

Storage : -65° C to +175° C

SILICON MULTIPLIER VARACTORS

Description

These silicon multiplier varactors (from 0.2 to 25 GHz) are designed for harmonic generation of high power levels (stack configuration) and/or at high multiplication orders.

Packaged diodes

CHARACTERISTICS AT 25°C		VARACTOR CHIPS PER PACKAGE	OUTPUT FREQ. F_O	BREAKDOWN VOLTAGE V_{BR}		JUNCTION CAPACIT. C_j		MIN. CAR. LIFETIME τ_l	SNAP-OFF TIME t_{so}	THERMAL RESISTANCE R_{th}	POWER OUTPUT P_O	
TEST CONDITIONS		PACKAGE	N/A	I_R = 10 µA		V_R = 6 V f = 1 MHz		I_F = 10 mA I_R = 6 mA	I_F = 10 mA V_R = 10 V	N/A	$f_O = (n)f_i$	
TYPE	CASE		GHz	V		pF		ns	ps	°C/W	W	
				min	max	min	max	min	max	max	typ.	(n)
DH294	DO7	1	0.2 - 2	45	70	4.0	7.0	125	400	300	0.5	2
DH200	F49	1	0.5 - 2	90	140	5.5	7.0	250	1000	8	20.0	2
DH270	S268-W1	1	2 - 3	80	110	4.0	5.5	160	700	10	15.0	2
DH110	F27d	1	2 - 4	60	90	3.0	4.0	100	400	25	9.0	2
DH293	F60d	1	3 - 6	50	70	2.0	3.0	60	250	30	6.0	2
DH252	F27d	1	2 - 8	40	60	0.9	2.0	35	200	50	3.0	2
DH256	F27d	1	5 - 12	30	45	0.5	1.1	20	120	60	2.0	2
DH292	F27d	1	8 - 16	20	35	0.2	0.5	10	75	70	0.6	2
DH267	F27d	1	10 - 25	15	25	0.2	0.3	6	60	100	0.2	2

Temperature ranges:

Operating junction (T_j) : -55° C to +150° C

Storage : -65° C to +175° C

MOS CAPACITORS CHIPS & ARRAYS

Selection Guide

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TOP PROCESS / HIGH PERFORMANCE

TEKELEC TEMEX M.O.S. (Metal - Oxide - Silicon) chips and arrays capacitors feature small size and high Q performances making them ideally suited for hybrid microwave circuits up to 30 GHz.

The dielectric (Silicon dioxide) thermally grown on a silicon wafer has a very low dielectric constant ($\in_1 = 3.9 \in_0$) and very stable temperature coefficient allowing a complete range of stable capacitance values (0.1 to 100 pF).

The dielectric thickness determines the rated voltage for a given capacitance value:

- V_R = 40 V e = 0.15 µm
- V_R = 100 V e = 0.25 µm
- V_R = 200 V e = 0.50 µm
- V_R = 400 V e = 1.0 µm
- V_R = 500 V e = 1.8 µm

The metallization areas which are the terminations of the capacitors are obtained with photo-masking technics and are made of sputtered titanium (≈ 700 Å) and gold (≈ 6000 Å).

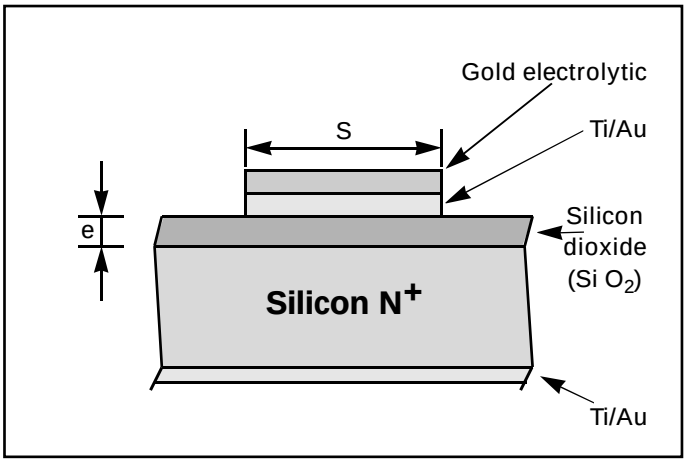
An electrolytic gold layer of 1.5 µm is made on top termination to ensure the best contact with the external circuits:

- Bottom termination attachment technics:
  EutecticAu-Sn (80/20) Melting point 280° C
  " " Au-Ge (88/12) Melting point 350° C
  Conductive epoxy
- Top termination:
  Thermocompression, Thermosonic and wedge bonding may be used.

Applications

- DC Block, RF by-pass
- Source by-pass
- Impedance matching - Trimming
- Filters
- Decoupling for Ga-As FET

Physical description



The capacitance is given by $C = \in_1 \times \frac{S}{e}$

$\in_1 = 3.9 \in_0$
S = surface of the top termination
e = thickness of the oxide

SINGLE-PAD CHIP CAPACITOR CS SERIES

General characteristics

Capacitance range (C_R): 0.1 to 100 pF.

See tables 1 & 2.

Tolerance capacitance:

- Standard : ± 20 % (CS, CJ, CB)
- Others : ± 10, ± 5, ± 2 % (consult us)

Rated voltage (U_R): See tables 1, 2 & 3.

Note: *Voltage and capacitance values being tightly linked to dielectric thickness and top termination area means, special requirements may be achieved by our engineers. Please consult us.*

Voltage proof (25° C): 1.5 x U_R

Insulation resistance (R_i): $R_i \geq 10^5$ MΩ.

(at rated voltage and 25° C)

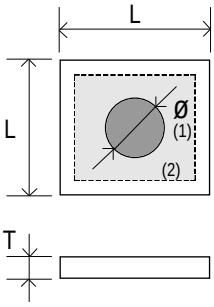
Temperature coefficient: 50 ppm°/C (typical) (over temperature range)

Storage and operating temperature range: - 55° C to + 200° C.

Environmental characteristics

CONSTRAINT		
CONSTRAINT	**STANDARD / CONDITIONS**	**Experimental results before first failure**
SALT SPRAY	NFC 20711: 35° C, 5% NaCl, 16, 24, 48, 96, 168, 336, 672 h. MIL STD 202 F, method 101D 35° C, 5% NaCl, 48, 96 h.	35° C 5 % NaCl > 400 hours
DAMP HEAT	NFC 20703 MIL STD 202 F, method 103B	40° C 93% RH > 56 days
CONTAMINENTS	GAM EG 13 50° C, 24 h. 65° C, 165 h.	Coolanol Kerozene Glycol > 1 000 hours
THERMAL SHOCK	NFC 20714 Temperature/nb of cycles specific MIL STD 202 F, method 107G N° cycles: 5, 25, 50, 100 A : - 55 / + 85° C B : - 65 / + 125° C C : - 65 / + 200° C D : - 65 / + 150° C	- 55 / + 125° C > 5 000 hours - 65 / + 175° C > 5 000 hours
RADIATION	On study	

Dimensions (in µm)



Case size	L min - max	T typical
MC106	340 - 400	200
MC107	540 - 600	200
MC108	740 - 800	200
MC110	940 - 1000	200

Note 1: *ø is indicated in table 1 for each capacitance value.*

Note 2: *Square termination may also be achieved. Please consult us.*

Table 1: Top termination diameter (µm) versus Capacitance / Voltage range

C_R	MC106	MC107	MC108	MC110
0.22 pF	145			
0.27 pF	160			
0.33 pF	180			
0.39 pF	200			
0.47 pF	220			
0.56 pF	240			500
0.68 pF	260			
0.82 pF	280			400
1.0 pF	220			200
1.2 pF	250			
1.5 pF	270			100
1.8 pF	300			
2.2 pF	230			40
2.7 pF	260			
3.3 pF	290			
3.9 pF	220	310		
4.7 pF	240	340		
5.6 pF	270	370		
6.8 pF	290	400		
8.2 pF	220	450		
10 pF	250	350		
12 pF	270	390	540	
15 pF	310	430	600	
18 pF		340	660	
22 pF		370	520	
27 pF		410	580	
33 pF		450	640	
39 pF		490	700	
47 pF			540	
56 pF			590	
68 pF			660	
82 pF				720
100 pF				780

MULTI-PADS CAPACITOR ARRAYS CJ SERIES

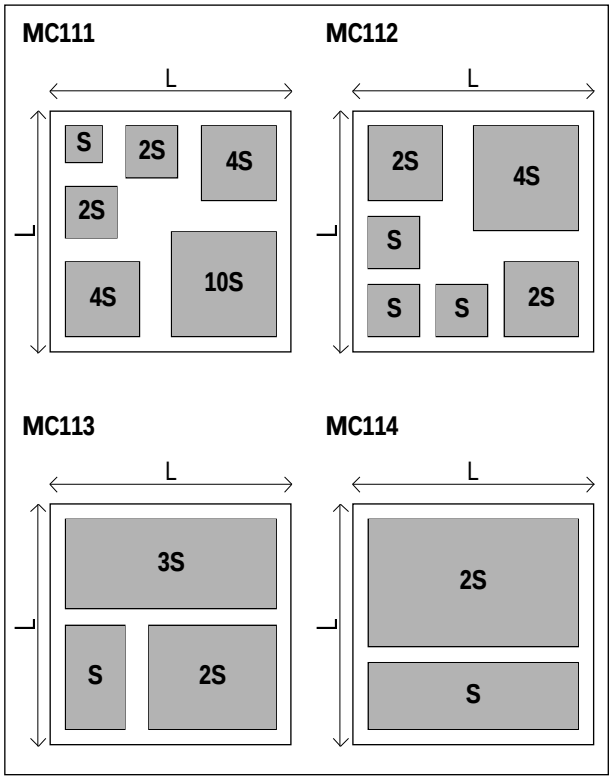
These capacitor arrays are intended for fine and precise adjustments in circuits which need to be tuned and kept tuned whatever the mechanical and environmental conditions are.

Note: *These capacitor arrays are made of several pads per case size.*
— For each case size, the unit and basic capacitance value is "S".
— This is also the value of the step capacitance.
— The number of steps is obtained with alll combinations to be achieved with the basic capacitance pad "S" and the other pads made of "2S", "4S", "10S"...
— The area of the minimum capacitance value "S" is given herebelow for each case size.

MC111	:	S	=	(70 x 70) µm²
MC112	:	S	=	(90 x 90) µm²
MC113	:	S	=	(180 x 270) µm²
MC114	:	S	=	(115 x 400) µm²

— For special designs, please consult us.

Dimensions (in µm)



Case size	L min - max	T typical
MC111	400 - 500	200
MC112	400 - 500	200
MC113	650 - 750	200
MC114	450 - 550	200

Table 2: Capacitance / Voltage range

Note: *Standard tolerance: ± 20% (M).*

Case Size	C min "S"	Number of steps	C max	Voltage (V_R)
MC111	0.125 pF	23	2.875 pF	400 V
MC111	0.25 pF	23	5.75 pF	200 V
MC111	0.50 pF	23	11.5 pF	100 V
MC112	0.2 pF	11	2.2 pF	400 V
MC112	0.4 pF	11	4.4 pF	200 V
MC112	0.8 pF	11	8.8 pF	100 V
MC113	10 pF	6	60 pF	40 V
MC114	10 pF	3	30 pF	40 V

MULTI-PADS BAR CAPACITORS CB SERIES

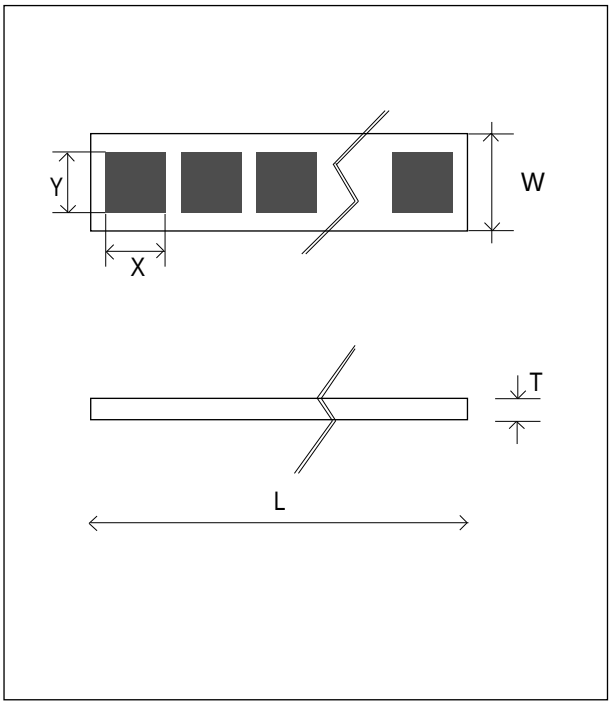
These capacitor arrays are primarily intended for mounting in Ga-As integrated circuit packaging for by-pass, decoupling and matching purposes.

They can also be used in hybrid circuits where high performance and stable capacitors are required.

The stable characteristics of these devices (temperature coefficient, low inductance, low insertion loss) are perfectly suited to civil and military applications in the SHF and VHF application ranges (radar, communications, transmission equipments).

Note: *A kit containing 1 bar of each assembly (3, 4 and 5 pads of 100 pF) is available from TEKELEC TEMEX Sales Office. Please consult us to get a free "MOS-BAR" kit sample.*

Dimensions (in mm): See table 3



Multi-pads arrays

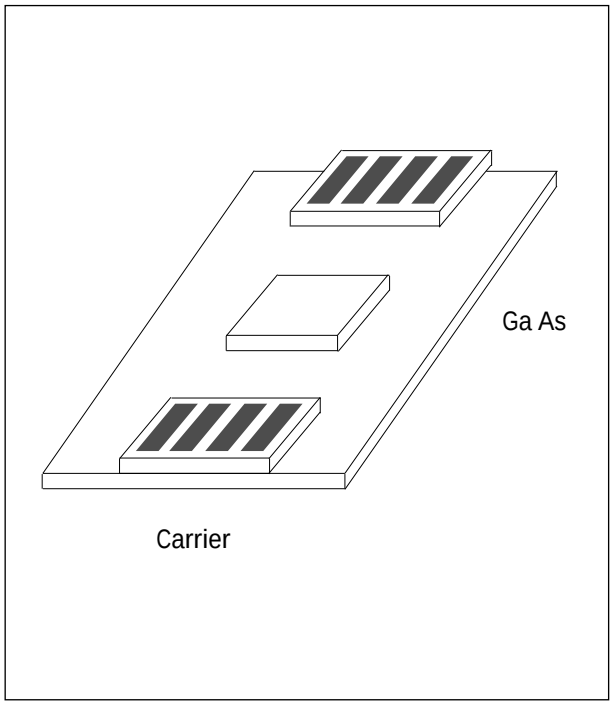


Table 3: Capacitance / Voltage range and dimensions (µm)

Note: *Standard tolerance: ± 20% (M).*

Case Size	Number of pads	Cr max per pad (pF)						L ± 125	W max	T typ.	X max	Y max
		500V	400V	200V	100V	40V	25V					
MC130	3	8	10	20	40	68	100	1650	980	200	400	850
MC140	4							2160				
MC150	5							2675				

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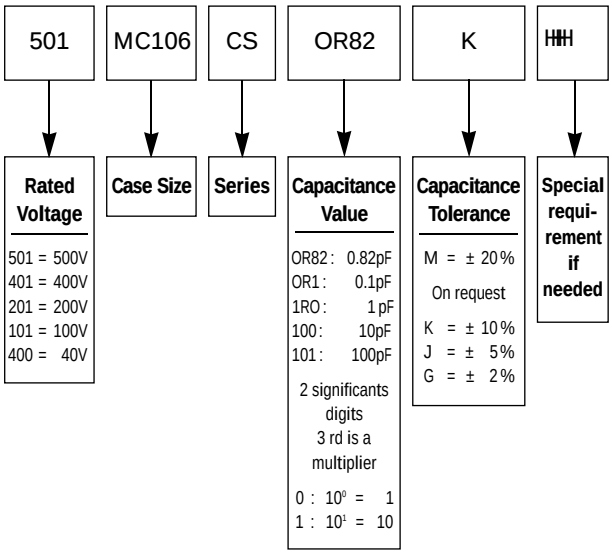
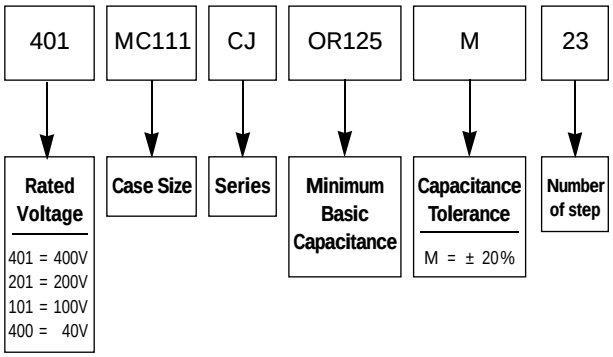
How to order

A - Single-pad chip capacitors

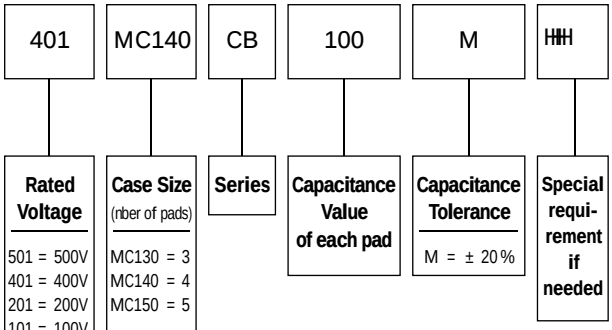


B - Multi-pads arrays capacitors



Ex.: MC111
0.125 pF min ± 20% - 400V
23 steps (C max = 2.875 pF)

C - Multi-pads bar capacitors



Designer kit: MOS-KIT

In order to back-up engineers in their design purposes, TEKELEC TEMEX proposes a kit made of following parts:

Case Size	Capacitance value
MC106	0.22 - 0.47 - 0.82 - 1 - 2.2 - 3.3 - 4.7 - 10 pF
MC107	6.8 - 15 - 33 pF
MC108	15 - 33 - 68 pF
MC110	100 pF
MC111	0.125 - 0.25 - 0.5 pF (C min)
MC112	0.2 - 0.4 - 0.8 pF (C min)
MC113	10 pF
MC114	10 pF

Capacitance tolerance: ± 20%

Please order: MOS-KIT

CASE STYLES

General Purpose

A22e
BH28
BH32
BH35

BH142a
BH142b
BH142c
BH142d
BH142e
BH142f

BH165
BH165s
BH167
BH167s

F27d
F30
F51
F54

F54s
F60
F60d
M208a
M208b
M208c
M208d
M208e

M208f
S268/W1

TO39
W2

Surface Mount Devices

SMD3
SMD4
SMD6
SMD8
SOD323
SOT23

SOT143

Power

BH141

BH158
BH158am

BH200a
BH202
BH203a
BH203b
BH203c
BH204

BH300
BH301
BH303
BH403a
BH405

Strip Line / Micro Strip

BH15
BH16
BH36
BH100

BH101

BH143
BH146
BH147
BH151
BH152
BH153
BH154
BH155

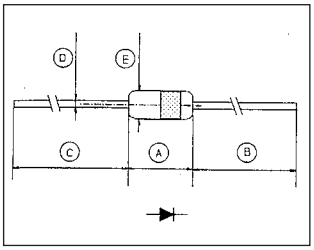
BMH76

Chip version

C2
C4

A22e

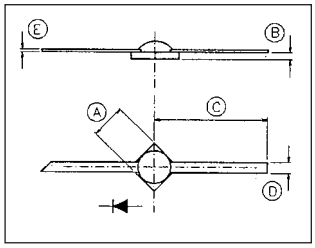
C_b=0.1pF



E	∅ 1.7	∅ 2.1	.067 DIA	.083 DIA
D	∅ 0.35	∅ 0.41	.014 DIA	.016 DIA
C	25.4		1	
B	25.4		1	
A	4	4.4	.157	.173
SYM	min	max	min	max
BOL	MILLIMETERS		INCHES	

BH15

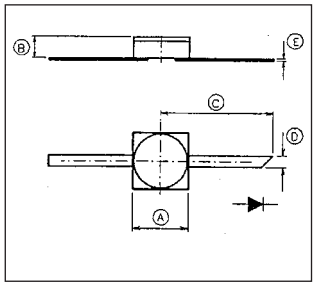
C_b=0.1pF



E	0.09	0.11	.0035	.0043
D	0.28	0.48	.011	.019
C	3.82	4.58	.15	.18
B	0.15	0.35	.006	.014
A	1.17	1.37	.046	.054
SYM	min	max	min	max
BOL	MILLIMETERS		INCHES	

BH16

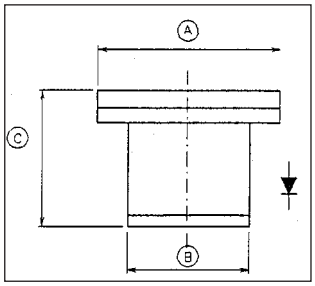
C_b=0.16pF



E	0.08	0.12	.003	.005
D	0.45	0.55	.018	.022
C	4.58	5.58	.180	.220
B	0.66	0.86	.026	.034
A	2.4	2.6	.094	.102
SYM	min	max	min	max
BOL	MILLIMETERS		INCHES	

BH28

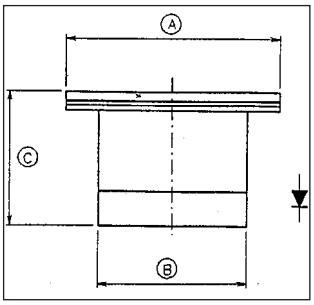
C_b=0.2pF



C	2.04	2.50	.080	.098
B	∅ 1.93	∅ 2.13	.076 DIA	.084 DIA
A	∅ 3.00	∅ 3.20	.118 DIA	.126 DIA
SYM	min	max	min	max
BOL	MILLIMETERS		INCHES	

BH32

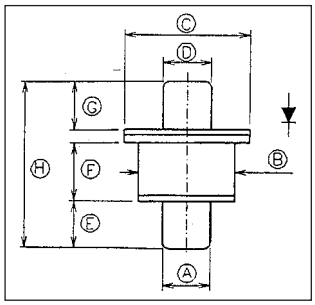
C_b=0.2pF



C	3.5	3.9	.138	.154
B	∅ 3.86	∅ 4.26	.152 DIA	.168 DIA
A	∅ 5.64	∅ 6.04	.222 DIA	.238 DIA
SYM	min	max	min	max
BOL	MILLIMETERS		INCHES	

BH35

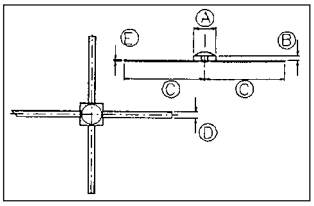
C_b=0.25pF



H	5.14	5.93	.202	.233
G	1.37	1.77	.054	.070
F	1.78	1.98	.070	.078
E	1.37	1.77	.054	.070
D	∅ 1.52	∅ 1.62	.060 DIA	.064 DIA
C	∅ 3.96	∅ 4.16	.156 DIA	.164 DIA
B	∅ 3.05	∅ 3.25	.120 DIA	.128 DIA
A	∅ 1.52	∅ 1.62	.060 DIA	.064 DIA
SYM	min	max	min	max
BOL	MILLIMETERS		INCHES	

BH36

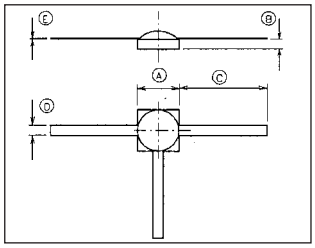
C_b=0.1pF



E	0.08	0.12	.003	.005
D	0.4	0.6	.016	.024
C	5.7	5.9	.224	.232
B	0.28	0.48	.011	.019
A	1.7	1.9	.067	.075
SYM	min	max	min	max
BOL	MILLIMETERS		INCHES	

BH100

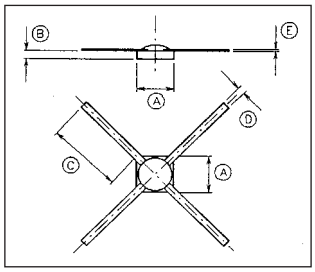
C_b=0.25pF



E	0.05	0.10	.002	.004
D	0.55	0.65	.022	.026
C	5		.197	
B	6.30	6.40	.248	.252
A	2.35	2.45	.093	.096
SYM	min	max	min	max
BOL	MILLIMETERS		INCHES	

BH101

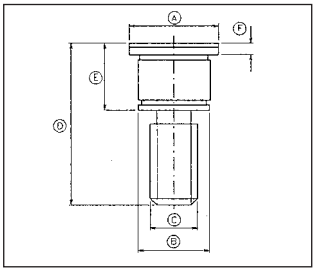
C_b=0.15pF



E	0.05	0.15	.002	.006
D	0.55	0.65	.022	.026
C	5		.197	
B	0.28	0.48	.011	.019
A	2.3	2.7	.091	.106
SYM	min	max	min	max
BOL	MILLIMETERS		INCHES	

BH141

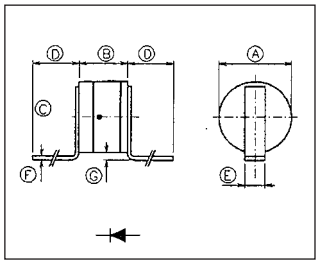
C_b=0.4pF



F		0.70		.028
E	4.70	5.10	.185	.201
D	12.8	13.4	.504	.526
C	6. 40 UNF-3A			
B	∅ 5.20	∅ 5.40	.205 DIA	.203 DIA
A	∅ 6.50	∅ 6.70	.256 DIA	.263 DIA
SYM	min	max	min	max
BOL	MILLIMETERS		INCHES	

BH142a

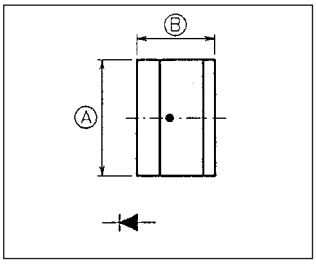
C_b=0.2pF



G	0.1	0.5	.004	.020
F	0.06	0.10	.0024	.0039
E	0.55	0.65	.022	.026
D	2.5		.098	
C	2.10	2.70	.083	.106
B	1.24	1.58	.049	.062
A	∅ 1.90	∅ 2.20	.075 DIA	.087 DIA
SYM	min	max	min	max
BOL	MILLIMETERS		INCHES	

BH142b

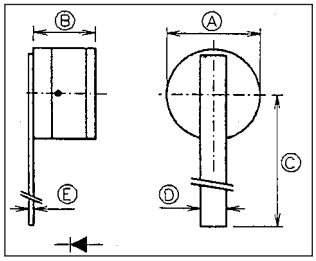
C_b=0.2pF



B	1.24	1.58	.049	.062
A	∅ 1.90	∅ 2.20	.075 DIA	.087 DIA
SYM	min	max	min	max
BOL	MILLIMETERS		INCHES	

BH142c

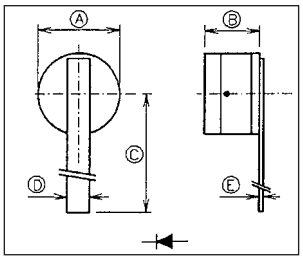
C_b=0.2pF



E	0.06	0.10	.0024	.0039
D	0.55	0.65	.022	.026
C	5		.197	
B	1.24	1.58	.049	.062
A	∅ 1.90	∅ 2.20	.075 DIA	.087 DIA
SYM	min	max	min	max
BOL	MILLIMETERS		INCHES	

BH142d

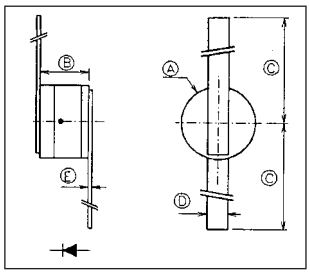
C_b=0.2pF



E	0.06	0.10	.0024	.0039
D	0.55	0.65	.022	.026
C	5		.197	
B	1.24	1.58	.049	.062
A	∅ 1.90	∅ 2.20	.075 DIA	.087 DIA
SYM	min	max	min	max
BOL	MILLIMETERS		INCHES	

BH142e

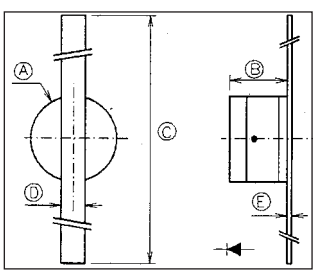
C_b=0.2pF



E	0.06	0.10	.0024	.0019
D	0.55	0.65	.022	.026
C	5		.197	
B	1.24	1.58	.049	.062
A	∅ 1.90	∅ 2.20	.075 DIA	.087 DIA
SYM	min	max	min	max
BOL	MILLIMETERS		INCHES	

BH142f

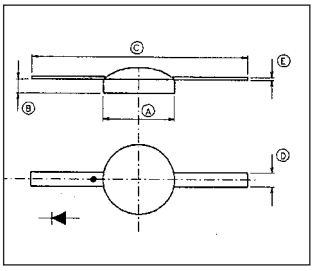
C_b=0.2pF



E	0.06	0.10	.0024	.0039
D	0.55	0.65	.022	.026
C	10		.394	
B	1.24	1.58	.049	.062
A	∅ 1.90	∅ 2.20	.075 DIA	.087 DIA
SYM	min	max	min	max
BOL	MILLIMETERS		INCHES	

BH143

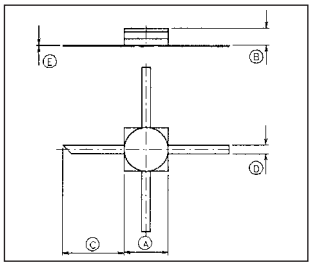
C_b=0.1pF



E	0.08	0.12	.003	.005
D	0.45	0.55	.094	.102
C	7.60		.299	
B	0.45	0.55	.018	.022
A	∅ 2.40	∅ 2.60	.094	.102
SYM	min	max	min	max
BOL	MILLIMETERS		INCHES	

BH146

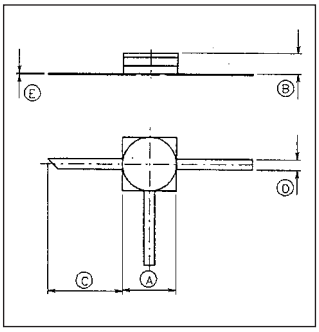
C_b=0.25pF



E	0.08	0.12	.003	.005
D	0.48	0.52	.019	.020
C	3.75		.148	
B	0.86	1.06	.034	.042
A	2.3	2.7	.091	.106
SYM	min	max	min	max
BOL	MILLIMETERS		INCHES	

BH147

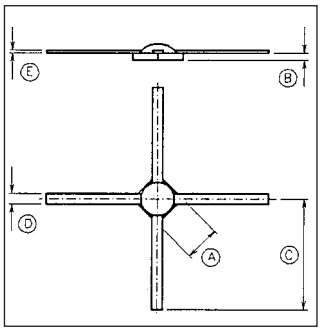
C_b=0.25pF



E	0.08	0.12	.003	.005
D	0.48	0.52	.019	.020
C	3.75		.148	
B	0.86	1.06	.034	.042
A	2.3	2.7	.091	.106
SYM	min	max	min	max
BOL	MILLIMETERS		INCHES	

BH151

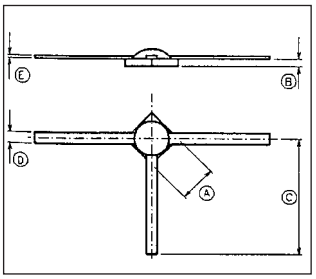
C_b=0.25pF



E	0.08	0.12	.003	.005
D	0.35	0.45	.014	.018
C	3.70	4.30	.147	.169
B	0.20	0.30	.008	.012
A	1.17	1.37	.046	.054
SYM	min	max	min	max
BOL	MILLIMETERS		INCHES	

BH152

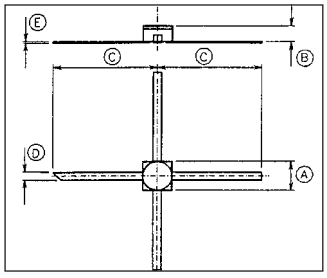
C_b=0.05pF



E	0.08	0.12	.003	.005
D	0.35	0.45	.014	.018
C	3.70	4.30	.147	.169
B	0.20	0.30	.008	.012
A	1.17	1.37	.046	.054
SYM	min	max	min	max
BOL	MILLIMETERS		INCHES	

BH153

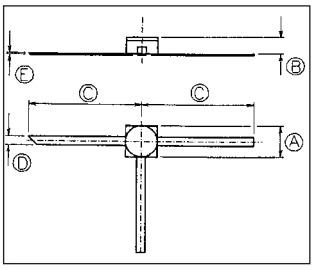
C_b=0.13pF



E	0.08	0.12	.003	.005
D	0.45	0.55	.018	.022
C	6.15	6.55	.242	.258
B	0.91	1.01	.036	.040
A	1.68	1.88	.066	.074
SYM	min	max	min	max
BOL	MILLIMETERS		INCHES	

BH154

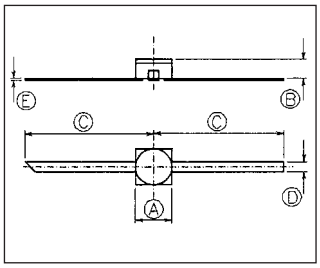
C_b=0.13pF



E	0.08	0.12	.003	.005
D	0.45	0.55	.018	.022
C	6.15	6.55	.242	.258
B	0.91	1.01	.036	.040
A	1.68	1.88	.066	.074
SYM	min	max	min	max
BOL	MILLIMETERS		INCHES	

BH155

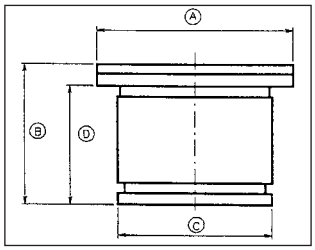
C_b=0.13pF



E	0.08	0.12	.003	.005
D	0.45	0.55	.018	.022
C	6.15	6.55	.242	.258
B	0.91	1.01	.036	.040
A	1.68	1.88	.066	.074
SYM	min	max	min	max
BOL	MILLIMETERS		INCHES	

BH158

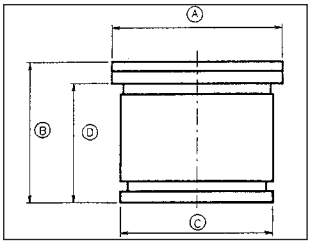
C_b=0.4pF



D	4.00	4.50	.157	.177
C	∅ 5.10	∅ 5.50	.200 DIA	.216 DIA
B	4.90	5.30	.193	.209
A	∅ 6.50	∅ 6.70	.256 DIA	.264 DIA
SYM	min	max	min	max
BOL	MILLIMETERS		INCHES	

BH158am

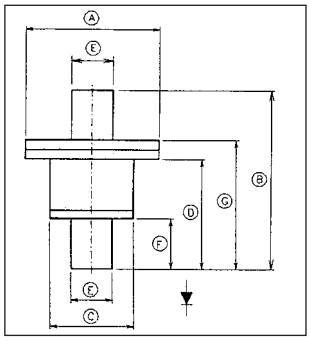
C_b=0.4pF



D	4.1	4.4	.16	.173
C	∅ 5.2	∅ 5.5	.204 DIA	.216 DIA
B	4.7	5.2	.185	.205
A	∅ 5.7	∅ 6.1	.224 DIA	.240 DIA
SYM	min	max	min	max
BOL	MILLIMETERS		INCHES	

BH165

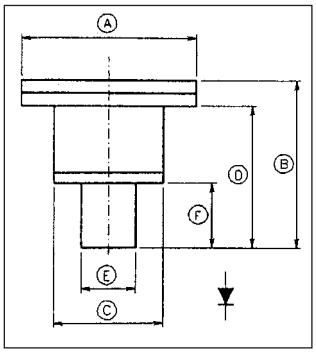
C_b=0.12pF



G	1.95	2.22	.077	.087
F	0.71	0.81	.028	.032
E	∅ 0.61	∅ 0.66	.024 DIA	.026 DIA
D	1.53	1.78	.060	.070
C	∅ 1.22	∅ 1.32	.048 DIA	.052 DIA
B	2.65	3.04	.104	.120
A	∅ 2.00	∅ 2.06	.079 DIA	.081 DIA
SYM	min	max	min	max
BOL	MILLIMETER		INCHES	

BH165s

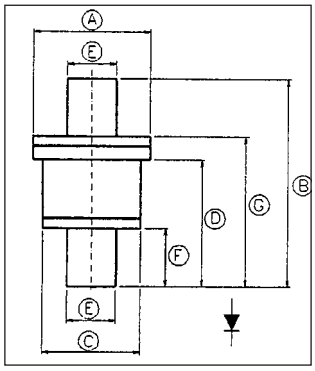
C_b=0.12pF



F	0.71	0.81	.028	.032
E	∅ 0.61	∅ 0.66	.024 DIA	.026 DIA
D	1.53	1.78	.060	.070
C	∅ 1.22	∅ 1.32	.048 DIA	.052 DIA
B	1.95	2.22	.077	.087
A	∅ 2.00	∅ 2.06	.079 DIA	.081 DIA
SYM	min	max	min	max
BOL	MILLIMETER		INCHES	

BH167

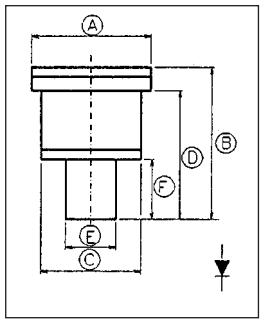
C_b=0.12pF



G	1.86	2.06	.073	.081
F	0.71	0.81	.028	.032
E	∅ 0.61	∅ 0.66	.024 DIA	.026 DIA
D	1.55	1.75	.060	.070
C	∅ 1.22	∅ 1.32	.048 DIA	052 DIA
B	2.57	2.87	.101	.113
A	∅ 1.42	∅ 1.62	.056 DIA	.064 DIA
SYM	min	max	min	max
BOL	MILLIMETERS		INCHES	

BH167s

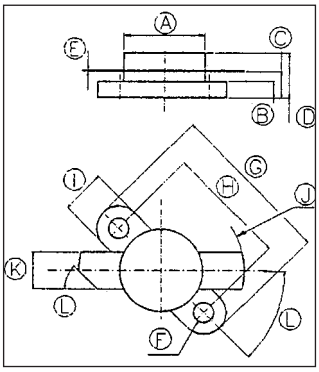
C_b=0.12pF



F	0.71	0.81	.028	.032
E	∅ 0.61	∅ 0.66	.024 DIA	.026 DIA
D	1.55	1.75	.061	.069
C	∅ 1.22	∅ 1.32	.048 DIA	.052 DIA
B	1.86	2.06	.073	.081
A	∅ 1.42	∅ 1.62	.056 DIA	.064 DIA
SYM	min	max	min	max
BOL	MILLIMETER		INCHES	

BH200a

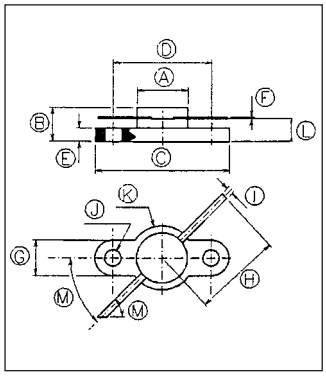
C_b=0.4pF



L	43°	47°	43°	47°
K	5.49	5.89	.216	.232
J	∅ 30.48	∅ 31.50	1.200 DIA	1.240 DIA
I	6.30	6.40	.248	.252
H	18.26	18.67	.719	.735
G	24.64	24.89	.970	.980
F	∅ 3.10	∅ 3.25	.122 DIA	.128 DIA
E	0.10	0.127	.004	.005
D	6.78	7.19	.267	.283
C	3.86	4.27	.152	.168
B	2.50	2.667	.098	.105
A	∅ 12.50	∅ 12.90	.492 DIA	.508 DIA
SYM	min	max	min	max
BOL	MILLIMETERS		INCHES	

BH202

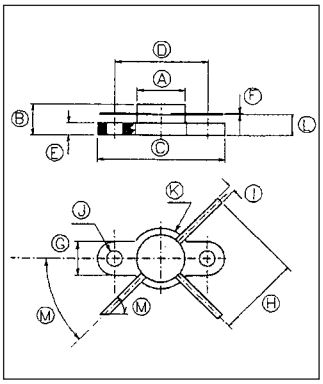
C_b=0.15pF



M	43°	47°	43°	47°
L	4.12	4.52	.162	.178
K	∅ 12.14	∅ 12.24	.478 DIA	.482 DIA
J	∅ 3.10	∅ 3.25	.122 DIA	.128 DIA
I	1.25	1.29	.049	.051
H	16.30	16.70	.642	.658
G	6.30	6.40	.248	.252
F	0.23	0.27	.009	.011
E	2.50	2..67	.098	.105
D	18.26	18.67	.719	.735
C	24.64	24.89	.970	.980
B	6.78	7.19	.267	.283
A	∅ 9.4	∅ 9.64	.370 DIA	.380 DIA
SYM	min	max	min	max
BOL	MILLIMETERS		INCHES	

BH203a

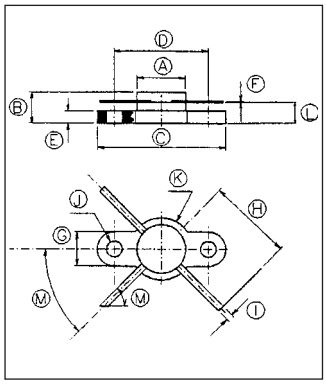
C_b=0.15pF



M	43°	47°	43°	47°
L	4.12	4.52	.162	.178
K	∅ 12.14	∅ 12.24	.478 DIA	.482 DIA
J	∅ 3.10	∅ 3.25	.122 DIA	.128 DIA
I	1.25	1.29	.049	.051
H	16.30	16.70	.642	.658
G	6.30	6.40	.248	.252
F	0.23	0.27	.009	.011
E	2.50	2.67	.098	.105
D	18.26	18.67	.719	.735
C	24.64	24.89	.970	.980
B	6.78	7.19	.267	.283
A	∅ 9.4	∅ 9.64	.370 DIA	.380 DIA
SYM	min	max	min	max
BOL	MILLIMETERS		INCHES	

BH203b

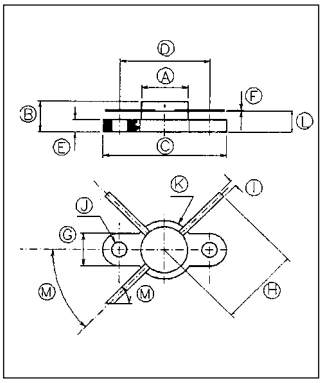
C_b=0.15pF



M	43°	47°	43°	47°
L	4.12	4.52	.162	.178
K	∅ 12.14	∅ 12.24	.478 DIA	.482 DIA
J	∅ 3.10	∅ 3.25	.122 DIA	.128 DIA
I	1.25	1.29	.049	.051
H	16.30	16.70	.642	.658
G	6.30	6.40	.248	.252
F	0.23	0.27	.009	.011
E	2.50	2.67	.098	.105
D	18.26	18.67	.719	.735
C	24.64	24.89	.970	.980
B	6.78	7.19	.267	.283
A	∅ 9.4	∅ 9.64	.370 DIA	.380 DIA
SYM	min	max	min	max
BOL	MILLIMETERS		INCHES	

BH203c

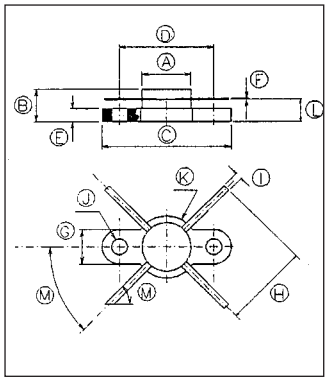
C_b=0.15pF



M	43°	47°	43°	47°
L	4.12	4.52	.162	.178
K	∅ 12.14	∅ 12.24	.478 DIA	.482 DIA
J	∅ 3.10	∅ 3.25	.122 DIA	.128 DIA
I	1.25	1.29	.049	.051
H	16.30	16.70	.642	.658
G	6.30	6.40	.248	.252
F	0.23	0.27	.009	.011
E	2.50	2.67	.098	.105
D	18.26	18.67	.719	.735
C	24.64	24.89	.970	.980
B	6.78	7.19	.267	.283
A	∅ 9.4	∅ 9.64	.370 DIA	.380 DIA
SYM	min	max	min	max
BOL	MILLIMETERS		INCHES	

BH204

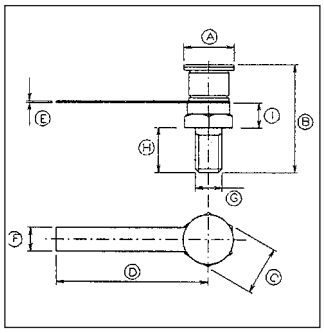
C_b=0.15pF



M	43°	47°	43°	47°
L	4.12	4.52	.162	.178
K	∅ 12.14	∅ 12.24	.478 DIA	.482 DIA
J	∅ 3.10	∅ 3.25	.122 DIA	.128 DIA
I	1.25	1.29	.049	.051
H	16.30	16.70	.642	.658
G	6.30	6.40	.248	.252
F	0.23	0.27	.009	.011
E	2.50	2.67	.098	.105
D	18.26	18.67	.719	.735
C	24.64	24.89	.970	.980
B	6.78	7.19	.267	.283
A	∅ 9.4	∅ 9.64	.370 DIA	.380 DIA
SYM	min	max	min	max
BOL	MILLIMETERS		INCHES	

BH300

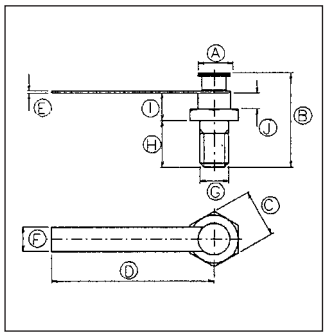
C_b=0.4pF



I	3.25	3.45	.128	.136
H	5.60	6.00	.220	.236
G	6 - 32 UNC - 3A			
F	2.97	3.38	.177	.133
E	0.20	0.30	.008	.012
D	20	-	.787	-
C	6.30	6.40	.248	.252
B	13.95	15.05	.549	.593
A	∅ 6.5	∅ 6.7	.256 DIA	.264 DIA
SYM	min	max	min	max
BOL	MILLIMETERS		INCHES	

BH301

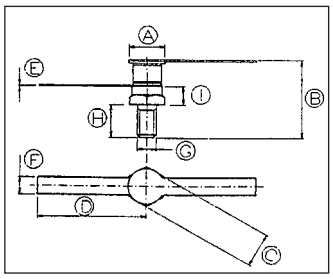
C_b=0.2pF



J	1.52	1.62	.060	.064
I	2.82	3.02	.111	.119
H	4.42	4.82	.174	.190
G	4 - 40 UNC - 3A			
F	2.16	2.56	.85	.101
E	0.18	0.20	.007	.008
D	15.67	16.18	.617	.637
C	4.70	4.80	.185	.189
B	9.46	10.54	.372	.415
A	∅ 3.00	∅ 3.20	.118 DIA	.126 DIA
SYM	min	max	min	max
BOL	MILLIMETERS		INCHES	

BH303

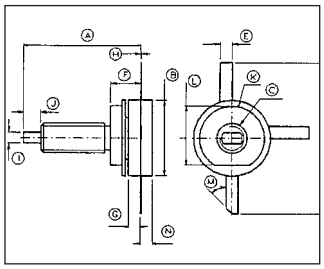
C_b=0.4pF



I	3.25	3.45	.128	.136
H	5.60	6.00	.220	.236
G	6 - 32 UNC - 3A			
F	2.97	3.38	.177	.133
E	0.20	0.30	.008	.012
D	20	-	.787	-
C	6.30	6.40	.248	.252
B	13.95	15.05	.549	.593
A	∅ 6.5	∅ 6.7	.256 DIA	.264 DIA
SYM	min	max	min	max
BOL	MILLIMETERS		INCHES	

BH403a

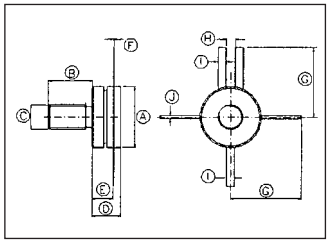
C_b=0.3pF



N	-	3	-	.120
M	Typical : 45°			
L	9.68	10.08	.381	.397
K	∅ 10.46	∅ 10.87	.412 DIA	.428 DIA
J	2.72	3.12	.107	.123
I	1.57	1.98	.062	.078
H	0.10	0.15	.004	.006
G	1.78	2.03	.070	.080
F	4.39	4.64	.173	.183
E	1.90	2.16	.075	.085
D	25.4	-	1	-
C	10 - 32 UNF 3A			
B	∅ 12.50	∅ 12.90	.492 DIA	.508
A	18.67	19.43	.735	.765
SYM	min	max	min	max
BOL	MILLIMETERS		INCHES	

BH405

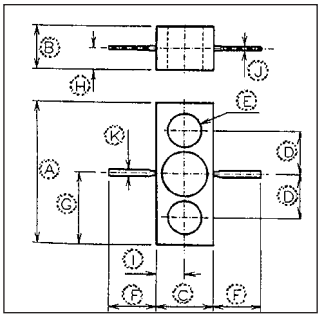
C_b=0.4pF



J	0.97	1.07	.038	.042
I	2.49	2.59	.098	.102
H	2.9	3.1	.114	.122
G	22.4	22.6	.882	.890
F	0.20	0.30	.0079	.0118
E	6.1	6.5	.240	.256
D	9.2	9.6	.362	.378
C	5/16 - 24 UNF - 2A			
B	14	14.2	.551	.559
A	∅ 19.6	∅ 19.8	.772 DIA	.780 DIA
SYM	min	max	min	max
BOL	MILLIMETERS		INCHES	

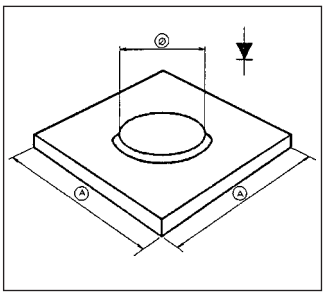
BMH76

C_b=0.15pF



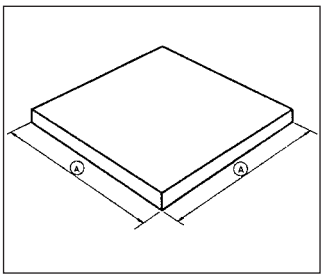
K	0.50	0.70	.020	.028
J	0.20	0.24	.008	.010
I	1.95	2.15	.077	.085
H	1.47	1.67	.058	.066
G	5.1	5.3	.201	.209
F	3.18	3.68	.125	.145
E	∅ 2.36	∅ 2.52	.093 DIA	.099 DIA
D	3.1	3.3	.122	.130
C	4	4.2	.157	.165
B	3.02	3.22	.119	.127
A	10.3	10.5	.406	.413
SYM	min	max	min	max
BOL	MILLIMETERS		INCHES	

C2



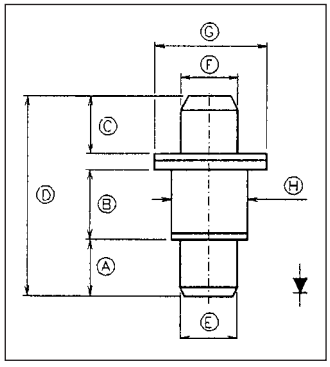
C2J	1740	1800	68.50	70.87
C2H	1440	1500	56.69	59.06
C2G	1140	1200	44.88	47.24
C2E	940	1000	37.01	39.37
C2D	840	900	33.07	35.43
C2C	740	800	29.13	31.50
C2B	540	600	21.26	23.62
C2A	340	400	13.39	15.75
CON	min	max	min	max
FIG	A (µm)		A (µ")	

C4



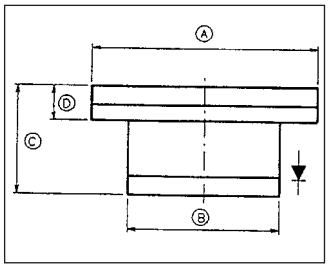
C4G	1500	2500	59.06	98.43
C4F	1000	1500	39.37	59.06
C4E	700	1000	27.56	39.37
C4D	500	700	19.69	27.56
C4C	400	500	15.75	19.69
C4B	300	400	11.81	15.75
C4A	200	300	7.87	11.81
CON	min	max	min	max
FIG	A (µm)		A (µ")	

F27d C_b=0.18pF



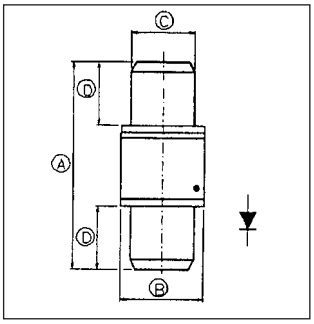
H	∅ 2.01	∅ 2.05	.079 DIA	.081 DIA
G	∅ 2.95	∅ 3.15	.116 DIA	.124 DIA
F	∅ 1.55	∅ 1.59	.061 DIA	.063 DIA
E	∅ 1.55	∅ 1.59	.061 DIA	.063 DIA
D	5.15	5.65	.202	.222
C	1.55	1.59	.061	.063
B	1.74	1.82	.069	.072
A	1.55	1.59	.061	.063
SYM	min	max	min	max
BOL	MILLIMETERS		INCHES	

F30 C_b=0.25pF



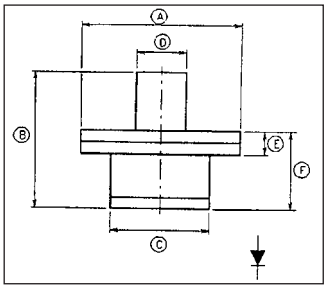
D	0.4	0.6	.016	.024
C	1.4	1.6	.055	.063
B	∅ 1.93	∅ 2.13	.076 DIA	.084 DIA
A	∅ 2.94	∅ 3.14	.116 DIA	.124 DIA
SYM	min	max	min	max
BOL	MILLIMETERS		INCHES	

F51 C_b=0.1pF



D	1.47	1.67	.058	.066
C	∅ 1.47	∅ 1.67	.058 DIA	.066 DIA
B	∅ 1.93	∅ 2.13	.076 DIA	.084 DIA
A	4.9	5.3	.193	.209
SYM	min	max	min	max
BOL	MILLIMETERS		INCHES	

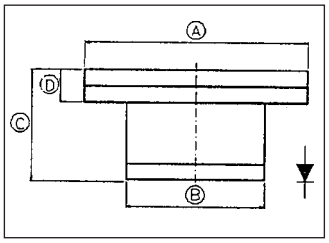
F54 C_b=0.2pF



F	1.0	1.2	.039	.047
E	0.40	0.47	.016	.019
D	∅ 0.61	∅ 0.66	.024 DIA	.029 DIA
C	∅ 1.19	∅ 1.35	.047 DIA	.053 DIA
B	1.70	2.00	.067	.079
A	∅ 2.00	∅ 2.16	.079 DIA	.085 DIA
SYM	min	max	min	max
BOL	MILLIMETER		INCHES	

F54s

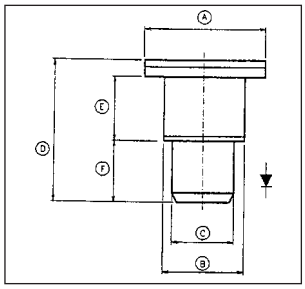
C_b=0.2pF



D	0.36	0.46	.014	.018
C	0.84	0.94	.073	.047
B	∅ 1.19	∅ 1.35	.047 DIA	.053 DIA
A	∅ 2.00	∅ 2.16	.079 DIA	.085 DIA
SYM	min	max	min	max
BOL	MILLIMETERS		INCHES	

F60

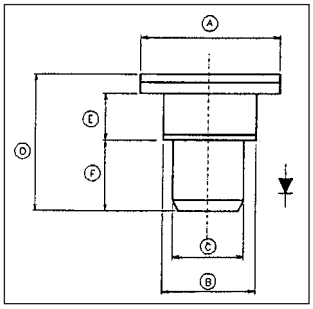
C_b=0.2pF



F	1.51	1.63	.059	.064
E	1.81	1.95	.071	.077
D	3.76	4.21	.148	.166
C	∅ 1.52	∅ 1.62	.060 DIA	.064 DIA
B	∅ 1.93	∅ 2.13	.076 DIA	.084 DIA
A	∅ 2.95	∅ 3.15	.116 DIA	.124 DIA
SYM	min	max	min	max
BOL	MILLIMETER		INCHES	

F60d

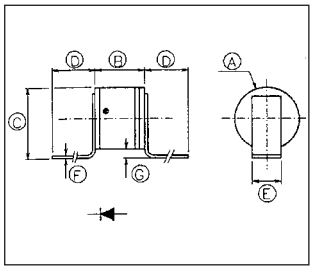
C_b=0.25pF



F	1.52	1.64	.060	.065
E	0.95	1.09	.037	.043
D	2.91	3.36	.115	.132
C	∅ 1.52	∅ 1.62	.060 DIA	.064 DIA
B	∅ 1.93	∅ 2.13	.076 DIA	.084 DIA
A	∅ 2.95	∅ 3.15	.116 DIA	.124 DIA
SYM	min	max	min	max
BOL	MILLIMETER		INCHES	

M208a

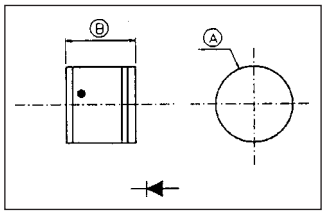
C_b=0.12pF



G	0.1	0.4	.004	.015
F	0.06	0.1	.0024	.004
E	0.55	0.65	.022	.026
D	2.5		.100	
C	1.3	1.7	.052	.068
B	0.95	1.35	.037	.053
A	∅ 1,07	∅ 1,47	.042 DIA	.058 DIA
SYM	min	max	min	max
BOL	MILLIMETER		INCHES	

M208b

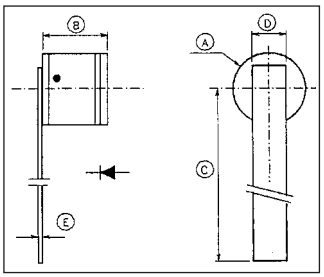
C_b=0.12pF



B	0.95	1.35	.037	.053
A	∅ 1.07	∅ 1.47	.042 DIA	.058 DIA
SYM	min	max	min	max
BOL	MILLIMETERS		INCHES	

M208c

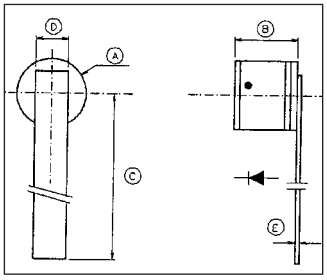
C_b=0.12pF



E	0.06	0.1	.0024	.004
D	0.55	0.65	.022	.026
C	5		.200	
B	0.95	1.35	.037	.053
A	∅ 1.07	∅ 1.47	.042 DIA	.058 DIA
SYM	min	max	min	max
BOL	MILLIMETERS		INCHES	

M208d

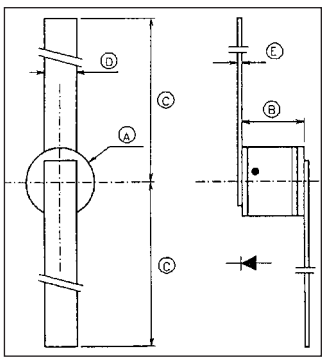
C_b=0.12pF



E	0.06	0.1	.0024	.004
D	0.55	0.65	.022	.026
C	5		.200	
B	0.95	1.35	.037	.053
A	∅ 1.07	∅ 1.47	.042 DIA	.058 DIA
SYM	min	max	min	max
BOL	MILLIMETERS		INCHES	

M208e

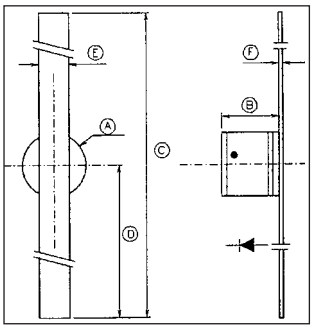
C_b=0.12pF



E	0.06	0.1	.0024	.004
D	0.55	0.65	.022	.026
C	5		.200	
B	0.95	1.35	.037	.053
A	∅ 1.07	∅ 1.47	.042 DIA	.058 DIA
SYM	min	max	min	max
BOL	MILLIMETERS		INCHES	

M208f

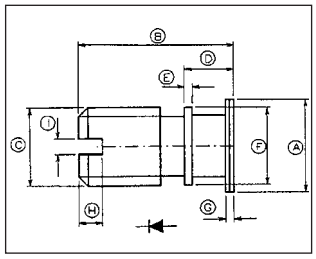
C_b=0.12pF



F	0.06	0.1	.0024	.004
E	0.55	0.65	.022	.026
D	5		.200	
C	9.8	10.2	.392	.408
B	0.95	1.35	.037	.053
A	∅ 1.07	∅ 1.47	.042 DIA	.058 DIA
SYM	min	max	min	max
BOL	MILLIMETER		INCHES	

S268/W1

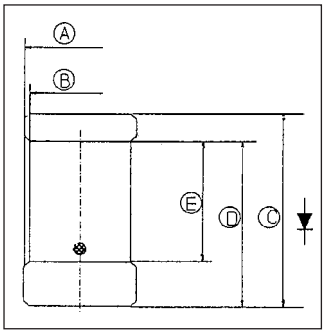
C_b=0.2pF



I	0.38	0.62	.015	.024
H	0.64	0.88	.025	.035
G	0.51	0.60	.020	.024
F	∅ 2.44	∅ 2.64	.096 DIA	.104 DIA
E	0.21	0.31	.008	.012
D	1.71	2.00	.067	.079
C	3 - 48 UNC 2A			
B	5.01	5.46	.197	.215
A	∅ 2.85	∅ 3.25	.112 DIA	.128 DIA
SYM	min	max	min	max
BOL	MILLIMETER		INCHES	

SMD3

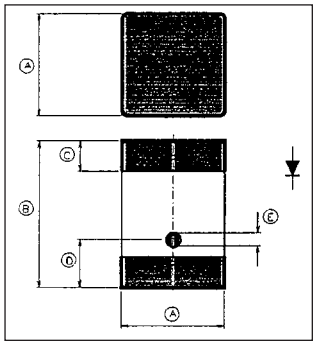
C_b=0.11pF



E	2.69	2.89	.106	.114
D	3.71	3.91	.146	.154
C	4.4	4.6	.173	.181
B	∅ 2.19	∅ 2.39	.086 DIA	.094 DIA
A	∅ 2.44	∅ 2.64	.096 DIA	.104 DIA
SYM	min	max	min	max
BOL	MILLIMETERS		INCHES	

SMD4

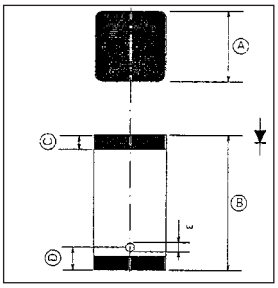
C_b=0.24pF



E	Typical 0,2		Typical .008	
D	Typical 1		Typical .039	
C	0.3	0.8	.012	.031
B	2.9	3.5	.114	.138
A	2	2.3	.079	.091
SYM	min	max	min	max
BOL	MILLIMETERS		INCHES	

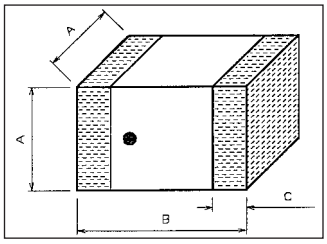
SMD6

C_b=0.24pF



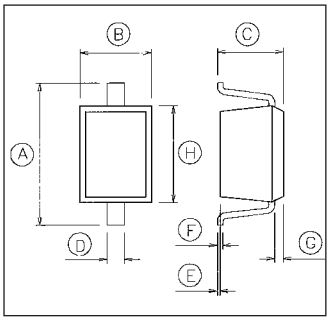
E	Typical 0,20		Typical .008	
D	Typical 1.20		Typical .047	
C	0.3	0.8	.012	.031
B	4.70	5.2	.185	.205
A	2.5	2.8	.098	.110
SYM	min	max	min	max
BOL	MILLIMETERS		INCHES	

SMD8



B	4.70	5.2	.185	.205
C	0.20	0.38	.008	.015
SYM	min	max	min	max
BOL	MILLIMETERS		INCHES	

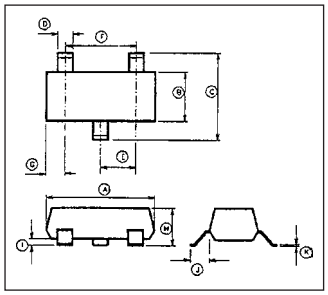
SOD323



H	1.70	.0669
G	0.20	.0078
F	0.15	.0059
E	0.05	.0020
D	0.30	.0118
C	1.10	.043
B	1.25	.049
A	2.50	.098
SYM	Typical	Typical
BOL	MILLIMETERS	INCHES

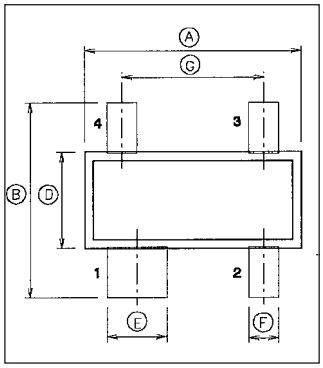
SOT23

C_b=0.2pF



K	0.1	0.13	0.004	0.005
J	0.53	0.56	0.021	0.022
I	0.05	0.1	0.002	0.0004
H	1.07	1.14	0.042	0.045
G	0.43	0.46	0.017	0.018
F	1.78	2.04	0.070	0.080
E	0.94 typ.		0.037 typ.	
D	0.43	0.45	0.017	0.020
C	2.36	2.49	0.093	0.098
B	1.3	1.35	0.051	0.053
A	2.84	3.02	0.112	0.119
SYM BOL	min Millimeters	max Millimeters	min Inches	max Inches

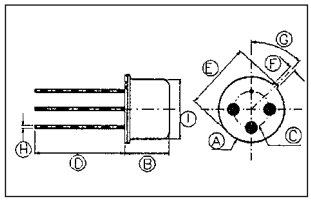
SOT143



J	max 8°	
I	0.10	.0039
H	0.12	.0047
G	1.90	.0075
F	0.40	.0157
E	0.80	.0315
D	1.30	.051
C	1.10	.043
B	2.60	.102
A	2.90	.114
SYM	Typical	Typical
BOL	MILLIMETERS	INCHES

TO39

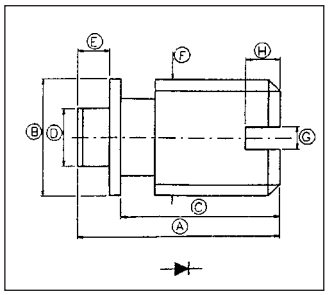
C_b=0.2pF



I	∅ 8.3	∅ 8.5	.327 DIA	.335 DIA
H	∅ 0.41	∅ 0.48	.016 DIA	.019 DIA
G	44°	46°	44°	46°
F	0.71	0.81	.028	.032
E	9.40	10.40	.370	.409
D	12.7		.500	
C	4.98	5.18	.196	.204
B	6.30	6.40	.248	.252
A	∅ 9.10	∅ 9.30	.358 DIA	.366 DIA
SYM	min	max	min	max
BOL	MILLIMETER		INCHES	

W2

C_b=0.15pF



H	0.71	0.81	.028	.032
G	0.45	0.55	.020	.022
F	3 - 48 UNC - 3A			
E	0.61	0.81	.024	.032
D	∅ 1.17	∅ 1.37	.046 DIA	.054 DIA
C	3.40	3.60	.134	.142
B	∅ 2.46	∅ 2.66	.097 DIA	.105 DIA
A	4.38	4.68	.172	.184
SYM	min	max	min	max
BOL	MILLIMETERS		INCHES	