

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.

TEMEX COMPONENTS 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}		Minority carrier lifetime τ_I
Test conditions	N/A		$I < 10\mu A$	$I < 10\mu A$	$V_R = 50 V$ $f = 1 MHz$		$f = 120 MHz$ I_F AS SHOWN		$I_F = 10 mA$ $I_R = 6mA$
TYPE	mm 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 $VSWR < 1.5$ $Z_0 = 50 \Omega$ 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.

These 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

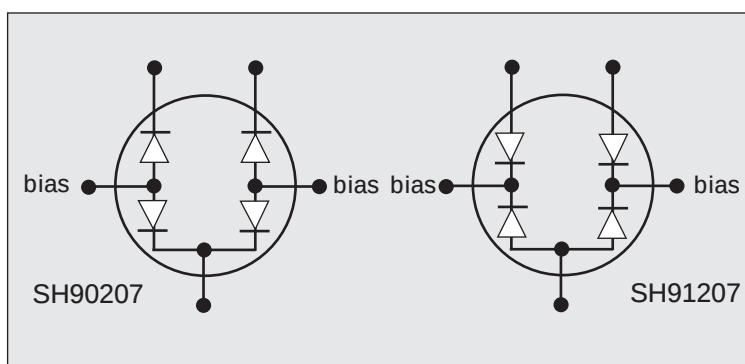
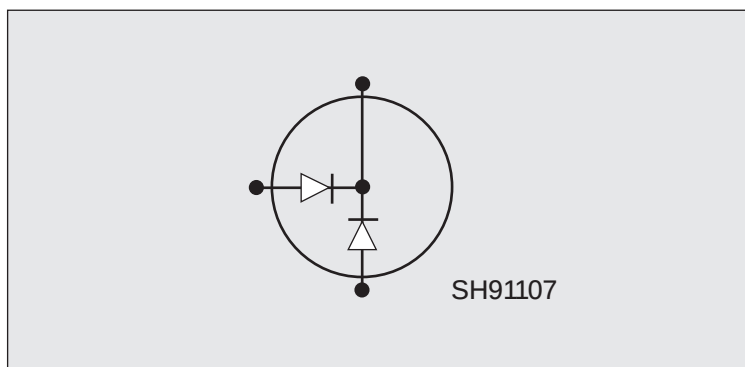
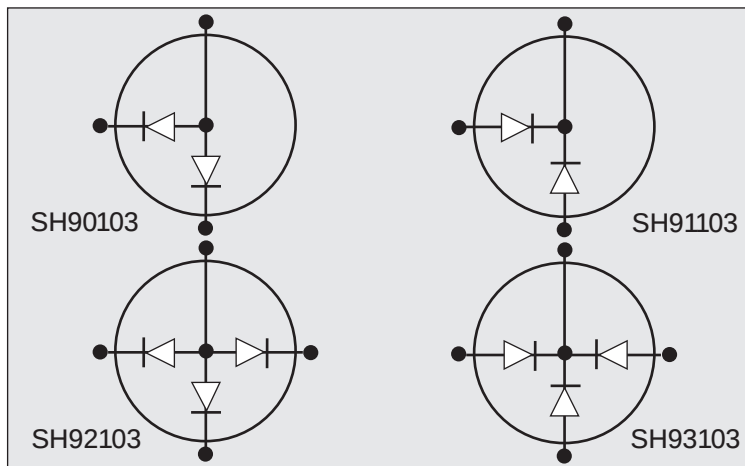
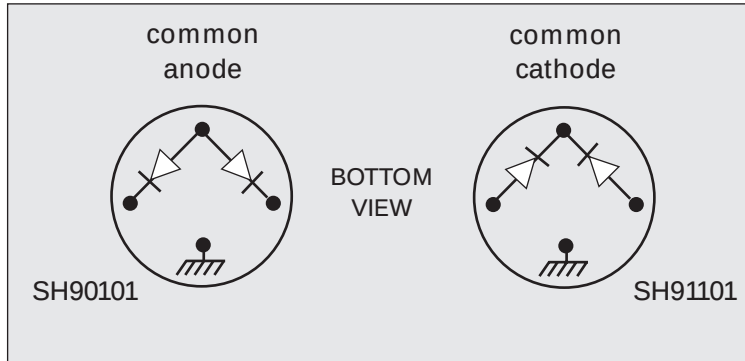
(2) Custom configurations available on request

Temperature ranges:

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

Storage : - 65° C to + 175° C

Internal wiring diagrams



Typical performances

INSERTION LOSS AND ISOLATION VERSUS FREQUENCY

