MMQA, SZMMQA Quad Common Anode Series

ESD Protection Diode

SC−74 Quad Monolithic Common Anode

This quad monolithic silicon voltage suppressor is designed for applications requiring transient overvoltage protection capability. It is intended for use in voltage and ESD sensitive equipment such as computers, printers, business machines, communication systems, medical equipment, and other applications. Its quad junction common anode design protects four separate lines using only one package. These devices are ideal for situations where board space is at a premium.

Features

- SC−74 Package Allows Four Separate Unidirectional Configurations
- Peak Power − Min. 24 W @ 1.0 ms (Unidirectional), per Figure 5 Waveform
- Peak Power − Min. 150 W @ 20 μs (Unidirectional), per Figure 6 Waveform
- Maximum Clamping Voltage @ Peak Pulse Current
- Low Leakage < 2.0 μA
- ESD Rating of Class 3B (exceeding 16 kV) per the Human Body Model
- SZ Prefix for Automotive and Other Applications Requiring Unique Site and Control Change Requirements; AEC−Q101 Qualified and PPAP Capable
- These Devices are Pb−Free and are RoHS Compliant*

*For additional information on our Pb−Free strategy and soldering details, please download the ON Semiconductor Soldering and Mounting Techniques Reference Manual, SOLDERRM/D.

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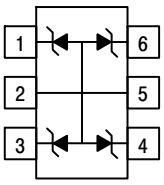
SC−74 QUAD SURGE PROTECTION 24 WATTS PEAK POWER 5.6 − 33 VOLTS

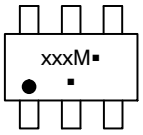
SC−74
CASE 318F
STYLE 1

PIN ASSIGNMENT



PIN 1. CATHODE
2. ANODE
3. CATHODE
4. CATHODE
5. ANODE
6. CATHODE

MARKING DIAGRAM



xxx = Specific Device Code
M = Date Cade
▪ = Pb−Free Package

(Note: Microdot may be in either location)

DEVICE MARKING & ORDERING INFORMATION

See specific marking and ordering information in the device marking and ordering information table on page 6 of this data sheet.

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THERMAL CHARACTERISTICS (T_A = 25°C Unless Otherwise Noted)

Characteristic	Symbol	Value	Unit
Peak Power Dissipation @ 1.0 ms (Note 1) @ $T_A \le 25°C$	P_{pk}	24	W
Peak Power Dissipation @ 20 μs (Note 2) @ $T_A \le 25°C$	P_{pk}	150	W
Total Power Dissipation on FR-5 Board (Note 3) @ T_A = 25°C	P_D	225 1.8	MW mW/°C
Thermal Resistance from Junction−to−Ambient	$R_{\theta JA}$	556	°C/W
Total Power Dissipation on Alumina Substrate (Note 4) @ T_A = 25°C Derate above 25°C	P_D	300 2.4	MW mW/°C
Thermal Resistance from Junction−to−Ambient	$R_{\theta JA}$	417	°C/W
Junction and Storage Temperature Range	T_J, T_{stg}	−55 to +150	°C
Lead Solder Temperature − Maximum (10 Second Duration)	T_L	260	°C

1. Non-repetitive current pulse per Figure 5 and derate above T_A = 25°C per Figure 4.
2. Non-repetitive current pulse per Figure 6 and derate above T_A = 25°C per Figure 4.
3. FR-5 = 1.0 x 0.75 x 0.62 in.
4. Alumina = 0.4 x 0.3 x 0.024 in., 99.5% alumina

ELECTRICAL CHARACTERISTICS (T_A = 25°C Unless Otherwise Noted)

UNIDIRECTIONAL

(Circuit tied to pins 1, 2, and 5; Pins 2, 3, and 5; Pins 2, 4, and 5; or Pins 2, 5, and 6) (V_F = 0.9 V Max @ I_F = 10 mA)

Device (Note 5)	Breakdown Voltage				Max Reverse Leakage Current		Max Zener Impedance (Note 7)	Max Reverse Surge Current	Max Reverse Voltage @ I_{RSM} (Note 8) (Clamping Voltage)	Maximum Temperature Coefficient of V_Z	Capacitance @ 0 Volt Bias, 1 MHz (pF)	
		V_{ZT} (Note 6) (V)		@ I_{ZT}	I_R	V_R						
	Min	Nom	Max	(mA)	(nA)	(V)	Z_{ZT} @ I_{ZT} (Ω) (mA)	I_{RSM} (A)	V_{RSM} (V)	(mV/°C)	Min	Max
MMQA5V6T1G	5.32	5.6	5.88	1.0	2000	3.0	400	3.0	8.0	1.26	–	–
MMQA6V2T1G/T3G	5.89	6.2	6.51	1.0	700	4.0	300	2.66	9.0	10.6	–	–
MMQA6V8T1G	6.46	6.8	7.14	1.0	500	4.3	300	2.45	9.8	10.9	100	250
MMQA12VT1G	11.4	12	12.6	1.0	75	9.1	80	1.39	17.3	14	–	–
MMQA13VT1G	12.4	13	13.7	1.0	75	9.8	80	1.29	18.6	15	–	–
MMQA15VT1G	14.3	15	15.8	1.0	75	11	80	1.1	21.7	16	–	–
MMQA18VT1G	17.1	18	18.9	1.0	75	14	80	0.923	26	19	–	–
MMQA20VT1G/T3G	19	20	21	1.0	75	15	80	0.84	28.6	20.1	–	–
MMQA22VT1G	20.9	22	23.1	1.0	75	17	80	0.758	31.7	22	–	–
MMQA24VT1G	22.8	24	25.2	1.0	75	18	100	0.694	34.6	25	–	–
MMQA27VT1G	25.7	27	28.4	1.0	75	21	125	0.615	39	28	–	–
MMQA33VT1G	31.4	33	34.7	1.0	75	25	200	0.504	48.6	37	–	–

5. Includes SZ-prefix devices where applicable.
6. V_Z measured at pulse test current I_T at an ambient temperature of 25°C.
7. Z_{ZT} is measured by dividing the AC voltage drop across the device by the AC current supplied. The specified limits are $I_{Z(AC)} = 0.1\ I_{Z(DC)}$, with AC frequency = 1 kHz.
8. Surge current waveform per Figure 5 and derate per Figure 4.

TYPICAL CHARACTERISTICS

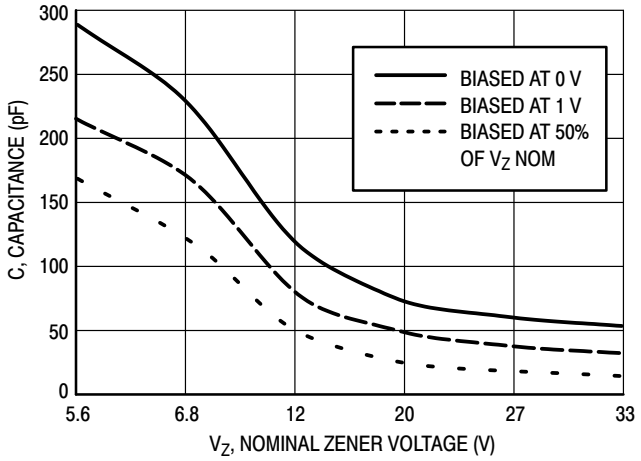


Figure 1. Typical Capacitance

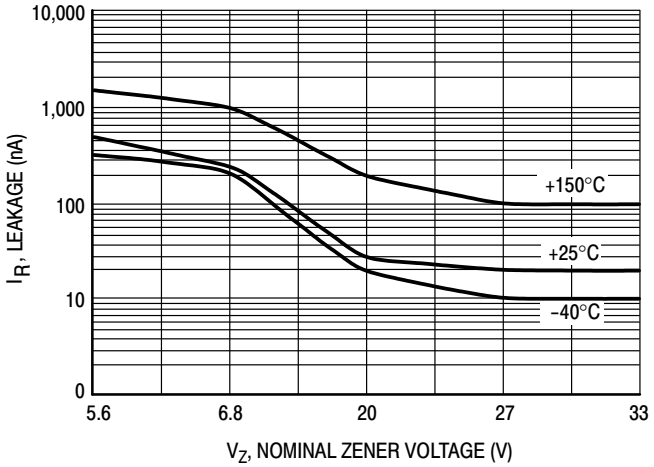


Figure 2. Typical Leakage Current

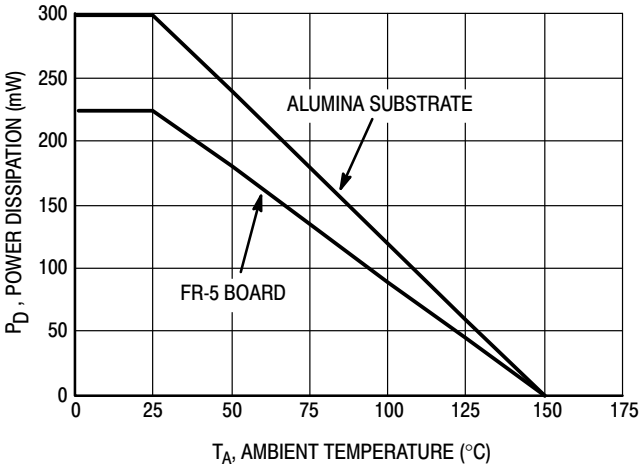


Figure 3. Steady State Power Derating Curve

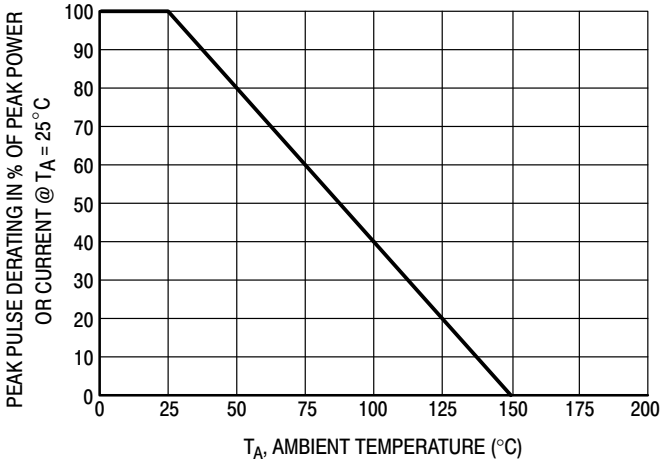


Figure 4. Pulse Derating Curve

TYPICAL CHARACTERISTICS

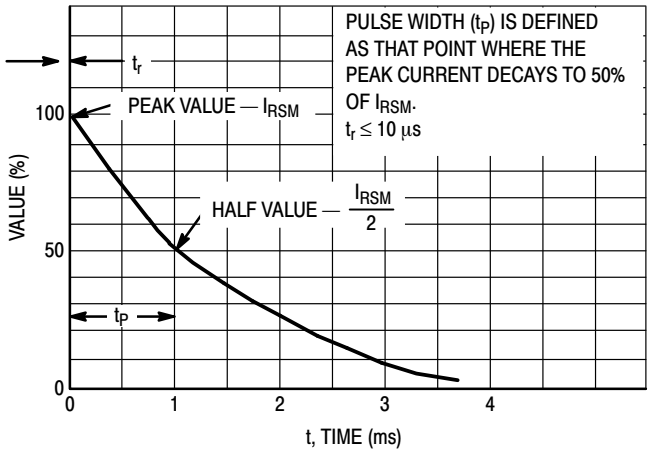


Figure 5. 10 × 1000 μs Pulse Waveform

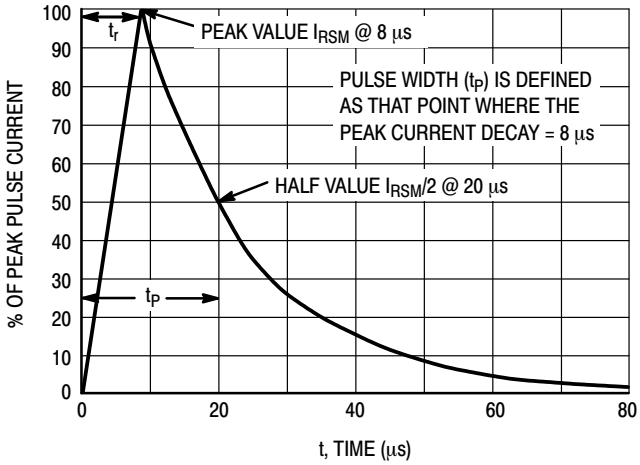


Figure 6. 8 × 20 μs Pulse Waveform

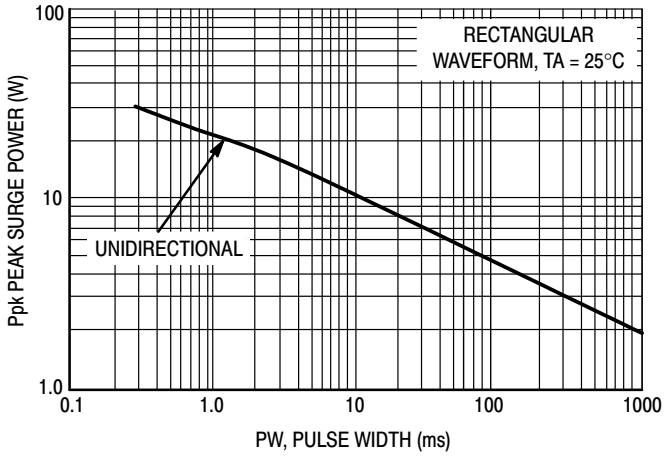


Figure 7. Maximum Non−Repetitive Surge Power, P_{pk} versus PW

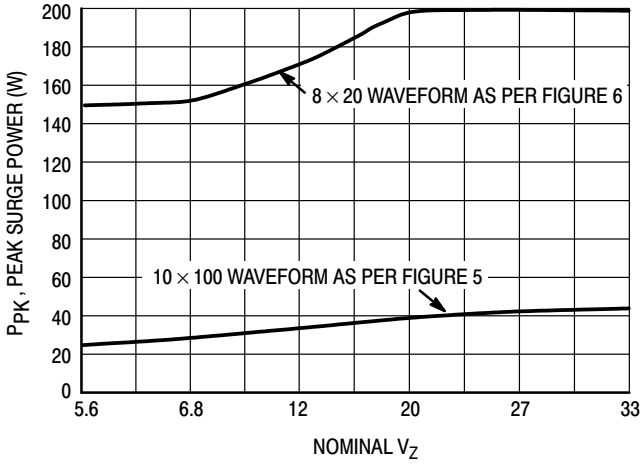


Figure 8. Typical Maximum Non−Repetitive Surge Power, P_{pk} versus V_Z

Power is defined as V_{RSM} x I_Z(pk) where V_{RSM} is the clamping voltage at I_Z(pk).

TYPICAL COMMON ANODE APPLICATIONS

A quad junction common anode design in a SC-74 package protects four separate lines using only one package. This adds flexibility and creativity to PCB design especially when board space is at a premium. A simplified example of MMQA/SZMMQA Series Device applications is illustrated below.

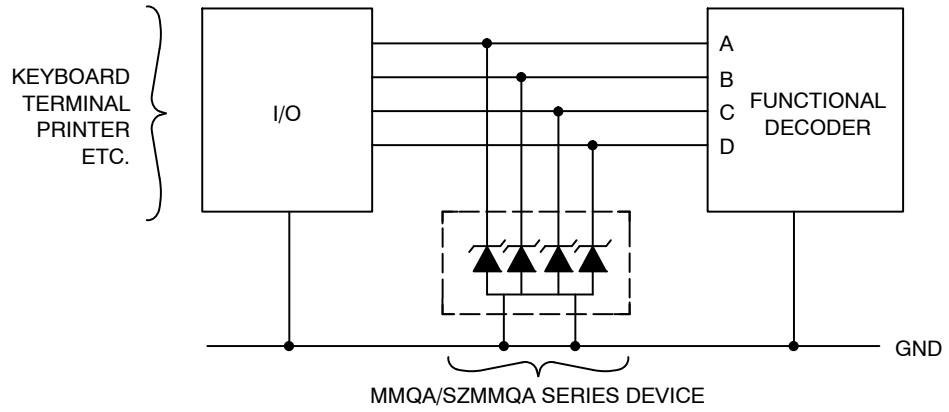


Figure 9. Computer Interface Protection

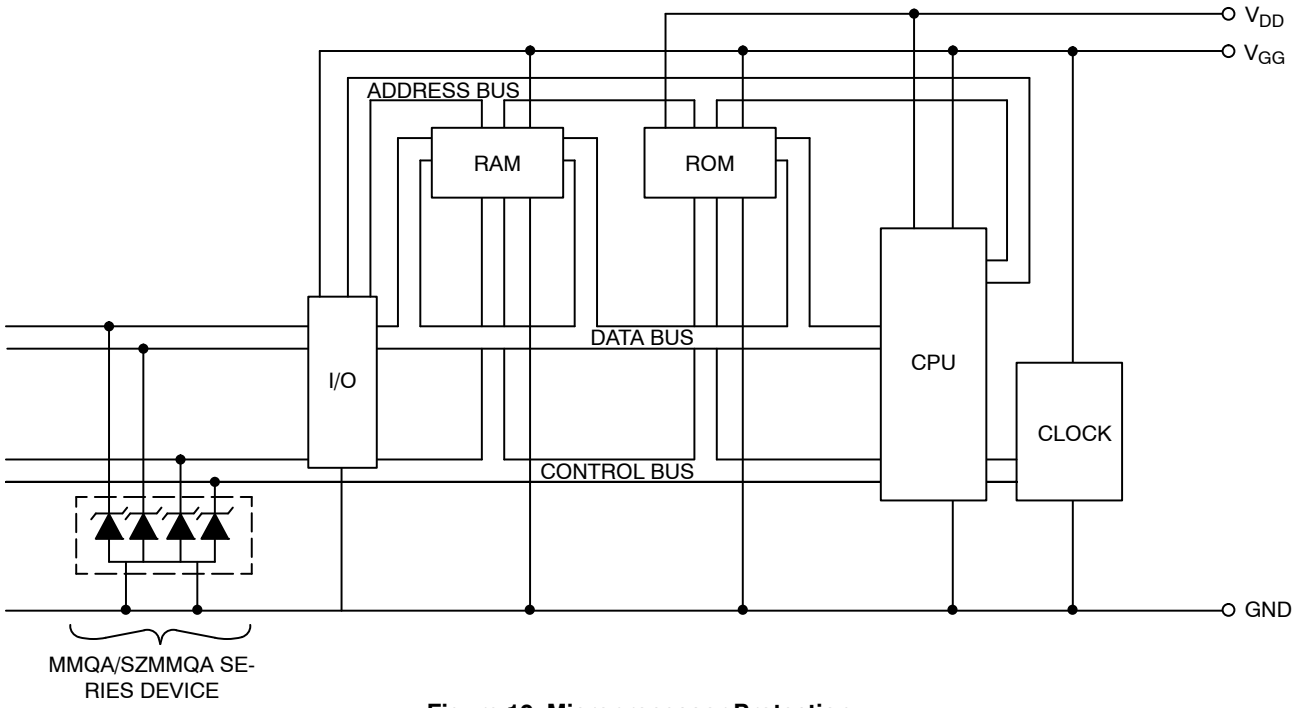


Figure 10. Microprocessor Protection

DEVICE MARKING AND ORDERING INFORMATION

Device*	Device Marking	Package	Shipping
MMQA5V6T1G	5A6	SC−74 (Pb−Free)	3,000/Tape & Reel
MMQA6V2T1G	6A2		3,000/Tape & Reel
MMQA6V2T3G	6A2		10,000/Tape & Reel
MMQA6V8T1G	6A8		3,000/Tape & Reel
MMQA12VT1G	12A		3,000/Tape & Reel
MMQA13VT1G	13A		3,000/Tape & Reel
MMQA15VT1G	15A		3,000/Tape & Reel
MMQA18VT1G	18A		3,000/Tape & Reel
MMQA20VT1G	20A		3,000/Tape & Reel
MMQA20VT3G	20A		10,000/Tape & Reel
MMQA22VT1G	22A		3,000/Tape & Reel
MMQA24VT1G	24A		3,000/Tape & Reel
MMQA27VT1G	27A		3,000/Tape & Reel
MMQA27VT3G	27A		10,000/Tape & Reel
MMQA33VT1G	33A		3,000/Tape & Reel

†For information on tape and reel specifications, including part orientation and tape sizes, please refer to our Tape and Reel Packaging Specification Brochure, BRD8011/D.
*IncludeS SZ-prefix devices where applicable.

Mechanical Characteristics:

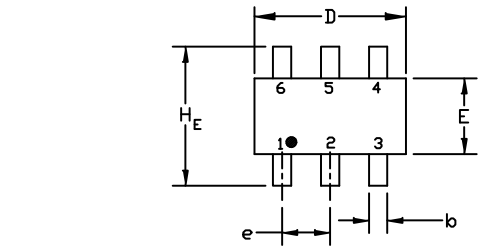
CASE: Void−free, Transfer−molded, Thermosetting Plastic Case.
FINISH: Corrosion resistant finish, easily solderable.
Package designed for optimal automated board assembly.
Small package size for high density applications.
Available in 8 mm Tape and Reel.
Use the Device Number to order the 7 inch/3,000 unit reel.
Replace the “T1” with “T3” in the Device Number to order the 13 inch/10,000 unit reel.

MECHANICAL CASE OUTLINE
PACKAGE DIMENSIONS

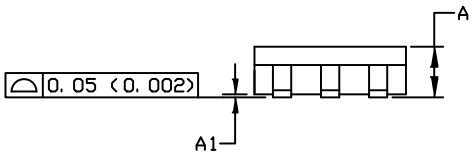
SCALE 2:1

SC−74
CASE 318F
ISSUE P

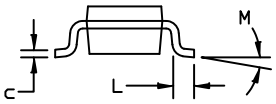
DATE 07 OCT 2021



TOP VIEW



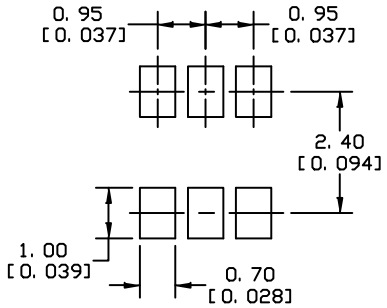
SIDE VIEW



END VIEW

NOTES:
1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M, 1994
2. CONTROLLING DIMENSION: INCHES
3. MAXIMUM LEAD THICKNESS INCLUDES LEAD FINISH THICKNESS. MINIMUM LEAD THICKNESS IS THE MINIMUM THICKNESS OF THE BASE MATERIAL.

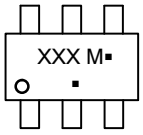
	MILLIMETERS			INCHES		
DIM	MIN.	NOM.	MAX.	MIN.	NOM.	MAX.
A	0.90	1.00	1.10	0.035	0.039	0.043
A1	0.01	0.06	0.10	0.001	0.002	0.004
b	0.25	0.37	0.50	0.010	0.015	0.020
c	0.10	0.18	0.26	0.004	0.007	0.010
D	2.90	3.00	3.10	0.114	0.118	0.122
E	1.30	1.50	1.70	0.051	0.059	0.067
e	0.85	0.95	1.05	0.034	0.037	0.041
H_E	2.50	2.75	3.00	0.099	0.108	0.118
L	0.20	0.40	0.60	0.008	0.016	0.024
M	0°	---	10°	0°	---	10°



* For additional information on our Pb-Free strategy and soldering details, please download the ON Semiconductor Soldering and Mounting Techniques Reference Manual, SOLDERRM/D.

SOLDERING FOOTPRINT

GENERIC MARKING DIAGRAM*



XXX = Specific Device Code
M = Date Code
▪ = Pb−Free Package

(Note: Microdot may be in either location)

*This information is generic. Please refer to device data sheet for actual part marking. Pb−Free indicator, “G” or microdot “▪”, may or may not be present. Some products may not follow the Generic Marking.

STYLE 1:
PIN 1. CATHODE
2. ANODE
3. CATHODE
4. CATHODE
5. ANODE
6. CATHODE

STYLE 2:
PIN 1. NO CONNECTION
2. COLLECTOR
3. EMITTER
4. NO CONNECTION
5. COLLECTOR
6. BASE

STYLE 3:
PIN 1. EMITTER 1
2. BASE 1
3. COLLECTOR 2
4. EMITTER 2
5. BASE 2
6. COLLECTOR 1

STYLE 4:
PIN 1. COLLECTOR 2
2. EMITTER 1/EMITTER 2
3. COLLECTOR 1
4. EMITTER 3
5. BASE 1/BASE 2/COLLECTOR 3
6. BASE 3

STYLE 5:
PIN 1. CHANNEL 1
2. ANODE
3. CHANNEL 2
4. CHANNEL 3
5. CATHODE
6. CHANNEL 4

STYLE 6:
PIN 1. CATHODE
2. ANODE
3. CATHODE
4. CATHODE
5. CATHODE
6. CATHODE

STYLE 7:
PIN 1. SOURCE 1
2. GATE 1
3. DRAIN 2
4. SOURCE 2
5. GATE 2
6. DRAIN 1

STYLE 8:
PIN 1. EMITTER 1
2. BASE 2
3. COLLECTOR 2
4. EMITTER 2
5. BASE 1
6. COLLECTOR 1

STYLE 9:
PIN 1. EMITTER 2
2. BASE 2
3. COLLECTOR 1
4. EMITTER 1
5. BASE 1
6. COLLECTOR 2

STYLE 10:
PIN 1. ANODE/CATHODE
2. BASE
3. EMITTER
4. COLLECTOR
5. ANODE
6. CATHODE

STYLE 11:
PIN 1. EMITTER
2. BASE
3. ANODE/CATHODE
4. ANODE
5. CATHODE
6. COLLECTOR

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DESCRIPTION:	**SC−74**	**PAGE 1 OF 1**

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