

MOSFET – Power, Single, N-Channel

40 V, 5.8 mΩ, 59 A



NTD5C464N

Features

- Low $R_{DS(on)}$ to Minimize Conduction Losses
- Low Q_G and Capacitance to Minimize Driver Losses
- These Devices are Pb-Free, Halogen Free/BFR Free and are RoHS Compliant

MAXIMUM RATINGS ($T_J = 25^\circ\text{C}$ unless otherwise noted)

Parameter	Symbol	Value	Unit
Drain-to-Source Voltage	V_{DSS}	40	V
Gate-to-Source Voltage	V_{GS}	± 20	V
Continuous Drain Current $R_{\theta JC}$ (Notes 1 & 3)	I_D	59	A
		44	
Power Dissipation $R_{\theta JC}$ (Note 1)	P_D	40	W
		20	
Continuous Drain Current $R_{\theta JA}$ (Notes 1, 2 & 3)	I_D	19	A
		14	
Power Dissipation $R_{\theta JA}$ (Notes 1 & 2)	P_D	4.0	W
		2.0	
Pulsed Drain Current	I_{DM}	431	A
Operating Junction and Storage Temperature	T_J, T_{stg}	-55 to 175	°C
Source Current (Body Diode)	I_S	44	A
Single Pulse Drain-to-Source Avalanche Energy ($I_{L(pk)} = 5 \text{ A}$)	E_{AS}	136	mJ
Lead Temperature for Soldering Purposes (1/8" from case for 10 s)	T_L	260	°C

Stresses exceeding those listed in the Maximum Ratings table may damage the device. If any of these limits are exceeded, device functionality should not be assumed, damage may occur and reliability may be affected.

THERMAL RESISTANCE MAXIMUM RATINGS

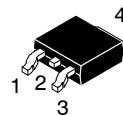
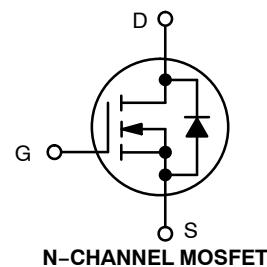
Parameter	Symbol	Value	Unit
Junction-to-Case (Drain) (Note 1)	$R_{\theta JC}$	3.8	°C/W
Junction-to-Ambient – Steady State (Note 2)	$R_{\theta JA}$	48	

1. The entire application environment impacts the thermal resistance values shown, they are not constants and are only valid for the particular conditions noted.
2. Surface-mounted on FR4 board using a 650 mm², 2 oz. Cu pad.
3. Maximum current for pulses as long as 1 second is higher but is dependent on pulse duration and duty cycle.

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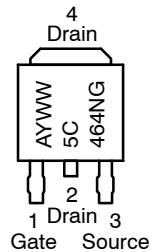
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$V_{(BR)DSS}$	$R_{DS(on)}$	I_D
40 V	5.8 mΩ @ 10 V	59 A



DPAK
CASE 369C
STYLE 2

MARKING DIAGRAM & PIN ASSIGNMENT



A = Assembly Location
Y = Year
WW = Work Week
5C464N = Device Code
G = Pb-Free Package

ORDERING INFORMATION

See detailed ordering and shipping information on page 5 of this data sheet.

NTD5C464N

ELECTRICAL CHARACTERISTICS (T_J = 25°C unless otherwise noted)

Parameter	Symbol	Test Condition	Min	Typ	Max	Unit
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OFF CHARACTERISTICS

Drain-to-Source Breakdown Voltage	V _{(BR)DSS}	V _{GS} = 0 V, I _D = 250 μA	40			V
Drain-to-Source Breakdown Voltage Temperature Coefficient	V _{(BR)DSS/T_J}			22		mV/°C
Zero Gate Voltage Drain Current	I _{DSS}	V _{GS} = 0 V, V _{DS} = 40 V	T _J = 25°C		10	μA
			T _J = 125°C		250	
Gate-to-Source Leakage Current	I _{GSS}	V _{DS} = 0 V, V _{GS} = 20 V			100	nA

ON CHARACTERISTICS (Note 4)

Gate Threshold Voltage	V _{GS(TH)}	V _{GS} = V _{DS} , I _D = 40 μA	2.0		4.0	V
Negative Threshold Temperature Coefficient	V _{GS(TH)/T_J}			6.8		mV/°C
Drain-to-Source On Resistance	R _{DS(on)}	V _{GS} = 10 V, I _D = 30 A		4.8	5.8	mΩ
Forward Transconductance	g _{FS}	V _{DS} = 3 V, I _D = 30 A		55		S

CHARGES, CAPACITANCES AND GATE RESISTANCES

Input Capacitance	C _{iss}	V _{GS} = 0 V, f = 1.0 MHz, V _{DS} = 20 V		1200		pF
Output Capacitance	C _{oss}			580		
Reverse Transfer Capacitance	C _{rss}			32		
Total Gate Charge	Q _{G(TOT)}	V _{GS} = 10 V, V _{DS} = 20 V, I _D = 30 A		20		nC
Threshold Gate Charge	Q _{G(TH)}			3.7		
Gate-to-Source Charge	Q _{GS}			6.2		
Gate-to-Drain Charge	Q _{GD}			4.0		
Plateau Voltage	V _{GP}			5.0		V

SWITCHING CHARACTERISTICS (Note 5)

Turn-On Delay Time	t _{d(on)}	V _{GS} = 10 V, V _{DS} = 20 V, I _D = 30 A, R _G = 2.5 Ω		9		ns
Rise Time	t _r			40		
Turn-Off Delay Time	t _{d(off)}			18		
Fall Time	t _f			5		

DRAIN-SOURCE DIODE CHARACTERISTICS

Forward Diode Voltage	V _{SD}	V _{GS} = 0 V, I _S = 30 A	T _J = 25°C		0.9	1.2	V
			T _J = 125°C		0.8		
Reverse Recovery Time	t _{RR}	V _{GS} = 0 V, dI _S /dt = 100 A/μs, I _S = 30 A			32		ns
Charge Time	t _a				16		
Discharge Time	t _b				17		
Reverse Recovery Charge	Q _{RR}				20		

4. Pulse Test: Pulse Width ≤ 300 μs, Duty Cycle ≤ 2%.

5. Switching characteristics are independent of operating junction temperatures.

TYPICAL CHARACTERISTICS

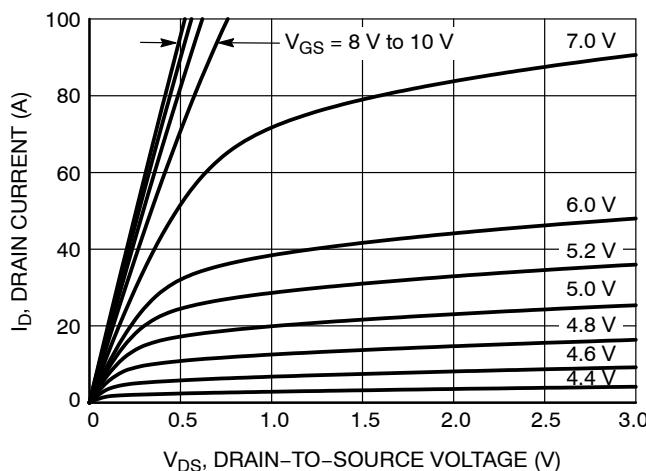


Figure 1. On-Region Characteristics

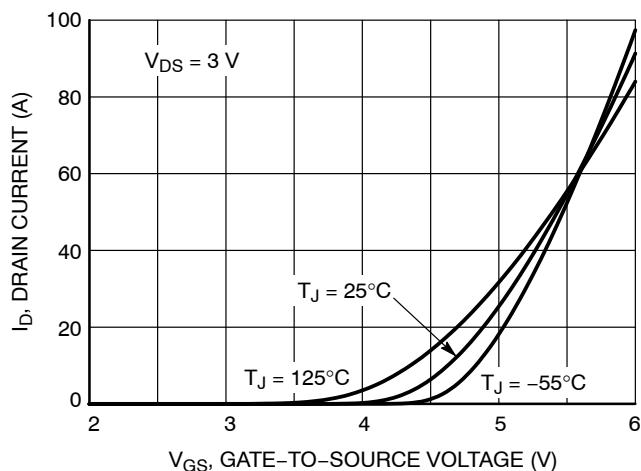


Figure 2. Transfer Characteristics

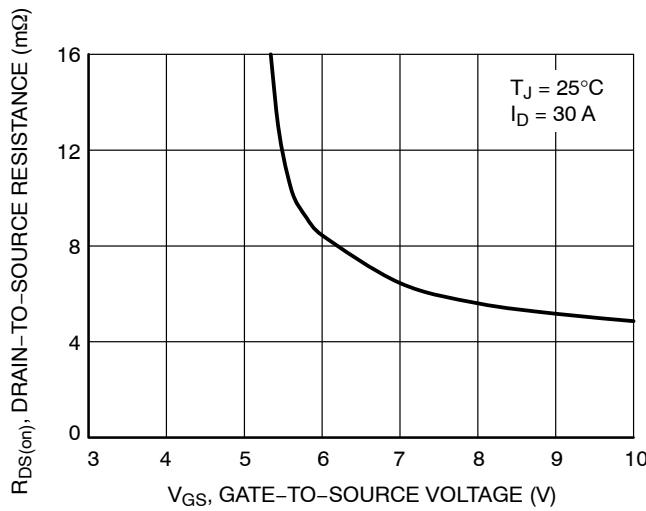


Figure 3. On-Resistance vs. Gate-to-Source Voltage

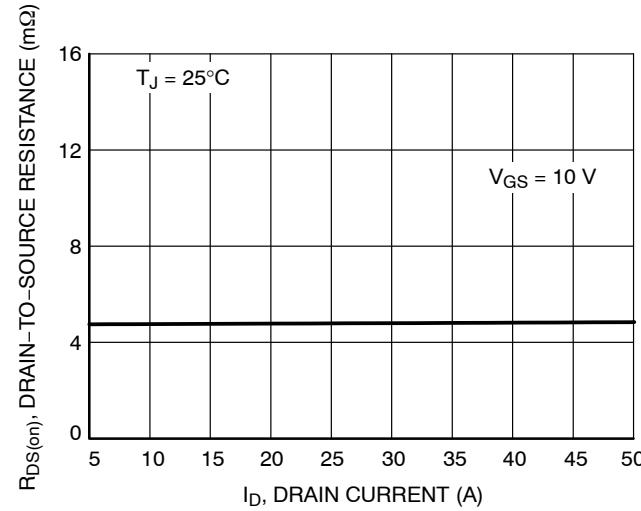


Figure 4. On-Resistance vs. Drain Current and Gate Voltage

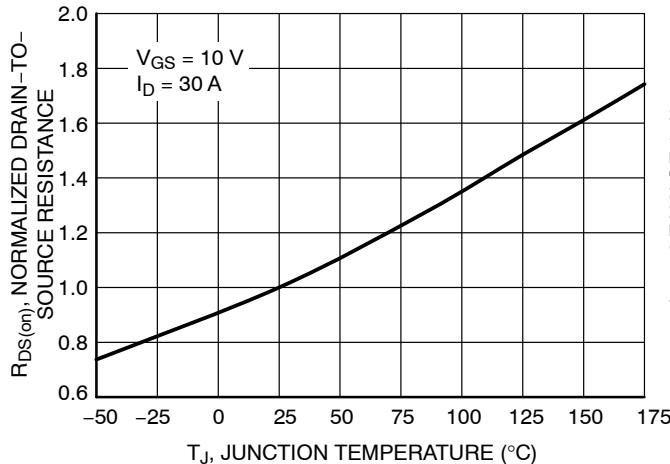


Figure 5. On-Resistance Variation with Temperature

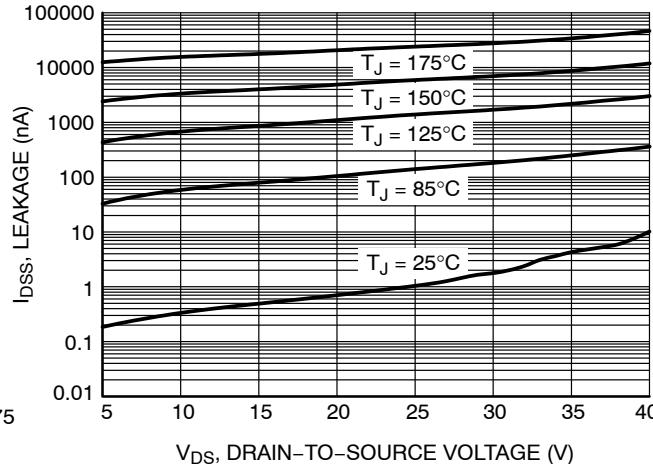
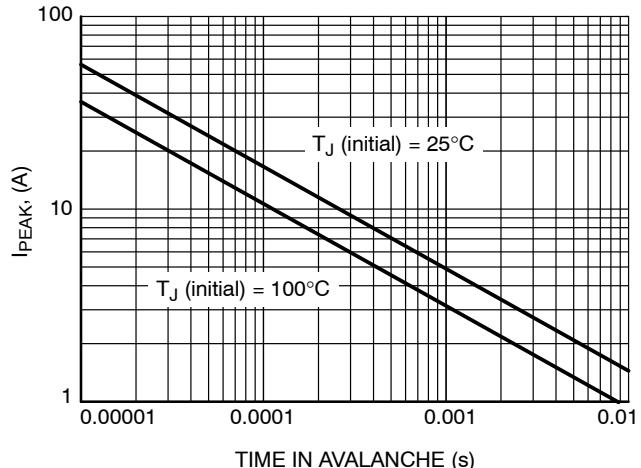
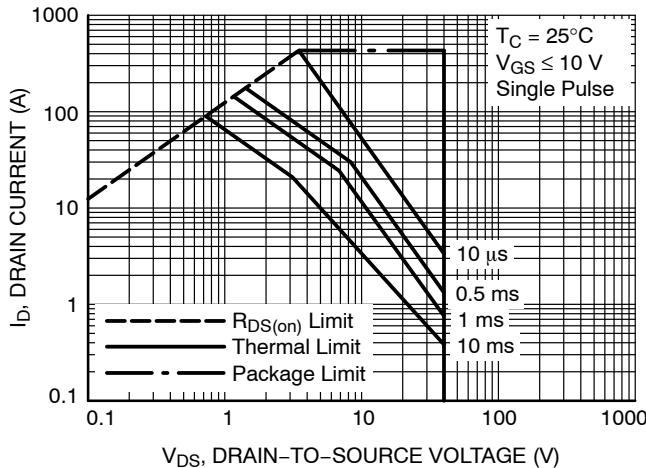
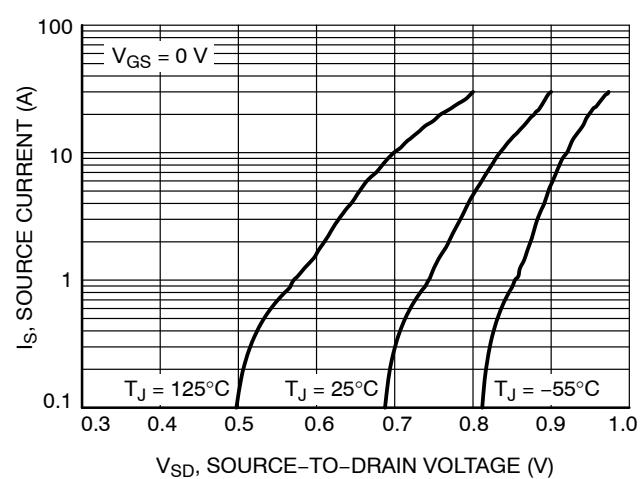
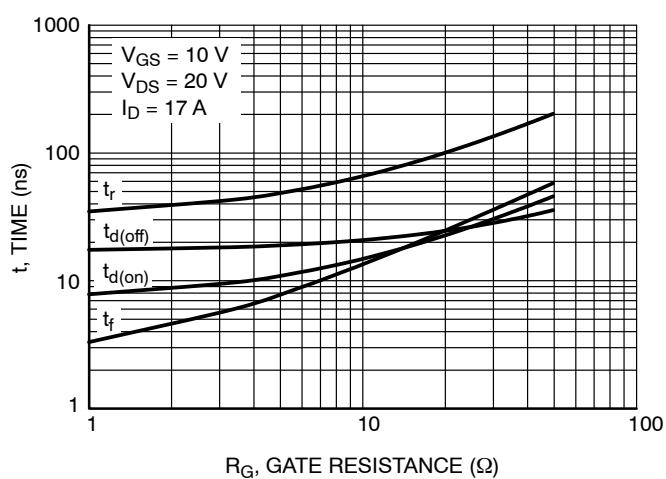
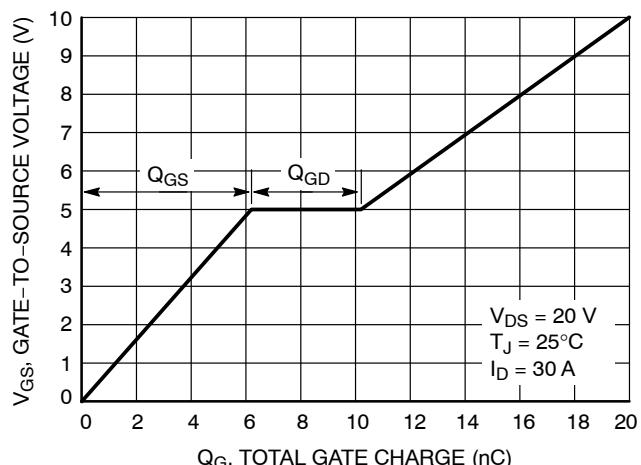
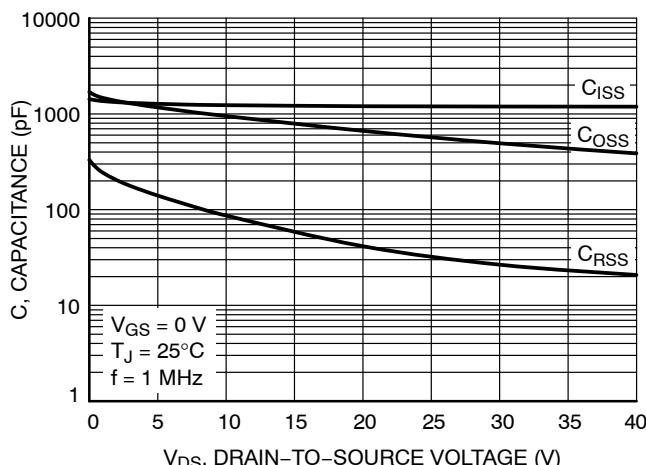


Figure 6. Drain-to-Source Leakage Current vs. Voltage

TYPICAL CHARACTERISTICS



NTD5C464N

TYPICAL CHARACTERISTICS

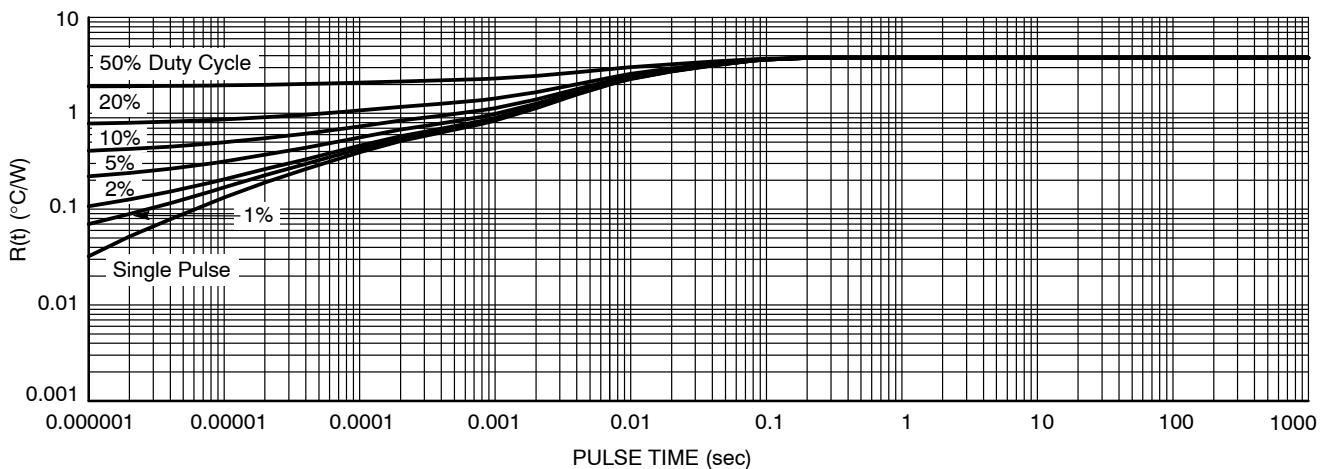
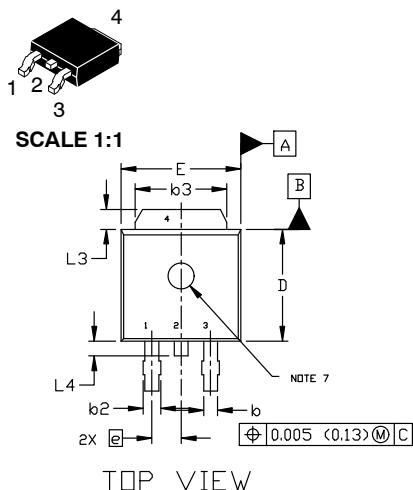


Figure 13. Thermal Characteristics

ORDERING INFORMATION

Order Number	Package	Shipping [†]
NTD5C464NT4G	DPAK (Pb-Free)	2500 / Tape & Reel

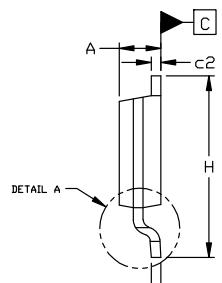
[†]For information on tape and reel specifications, including part orientation and tape sizes, please refer to our Tape and Reel Packaging Specifications Brochure, BRD8011/D.



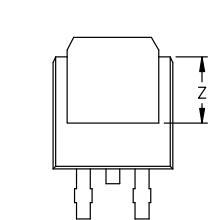
TOP VIEW

DPAK (SINGLE GAUGE)
CASE 369C
ISSUE G

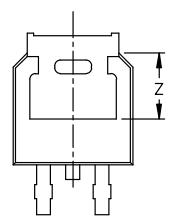
DATE 31 MAY 2023



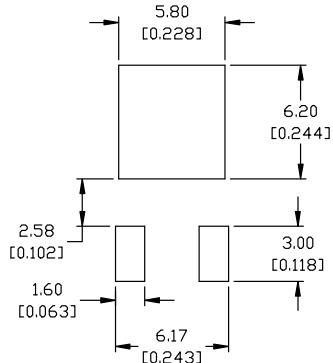
SIDE VIEW



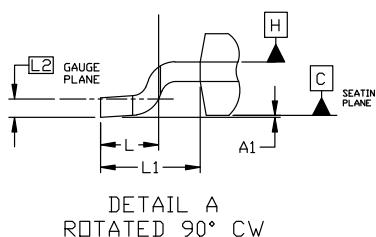
BOTTOM VIEW



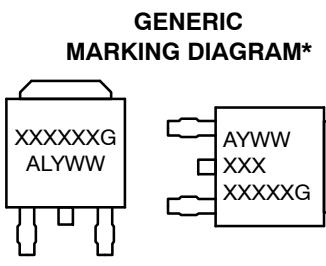
BOTTOM VIEW



ALTERNATE CONSTRUCTIONS

DETAIL A
ROTATED 90° CW

DIM	INCHES		MILLIMETERS	
	MIN.	MAX.	MIN.	MAX.
A	0.086	0.094	2.18	2.38
A1	0.000	0.005	0.00	0.13
b	0.025	0.035	0.63	0.89
b2	0.028	0.045	0.72	1.14
b3	0.180	0.215	4.57	5.46
c	0.018	0.024	0.46	0.61
c2	0.018	0.024	0.46	0.61
D	0.235	0.245	5.97	6.22
E	0.250	0.265	6.35	6.73
e	0.090 BSC	0.229 BSC		
H	0.370	0.410	9.40	10.41
L	0.055	0.070	1.40	1.78
L1	0.114 REF	2.90 REF		
L2	0.020 BSC	0.51 BSC		
L3	0.035	0.050	0.89	1.27
L4	----	0.040	----	1.01
Z	0.155	----	3.93	----



IC Discrete

XXXXXX = Device Code
A = Assembly Location
L = Wafer Lot
Y = Year
WW = Work Week
G = Pb-Free Package

*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.

RECOMMENDED MOUNTING FOOTPRINT*

*FOR ADDITIONAL INFORMATION ON OUR PB-FREE STRATEGY AND SOLDERING DETAILS, PLEASE DOWNLOAD THE ON SEMICONDUCTOR SOLDERING AND MOUNTING TECHNIQUES REFERENCE MANUAL, SOLDERRM/D.

STYLE 1:
PIN 1. BASE
2. COLLECTOR
3. Emitter
4. COLLECTOR

STYLE 2:
PIN 1. GATE
2. DRAIN
3. SOURCE
4. DRAIN

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

STYLE 4:
PIN 1. CATHODE
2. ANODE
3. GATE
4. ANODE

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

STYLE 6:
PIN 1. MT1
2. MT2
3. GATE
4. MT2

STYLE 7:
PIN 1. GATE
2. COLLECTOR
3. Emitter
4. COLLECTOR

STYLE 8:
PIN 1. N/C
2. CATHODE
3. ANODE
4. CATHODE

STYLE 9:
PIN 1. ANODE
2. CATHODE
3. RESISTOR ADJUST
4. CATHODE

STYLE 10:
PIN 1. CATHODE
2. ANODE
3. CATHODE
4. ANODE

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