NTR3A085PZ

MOSFET – Power, Single P-Channel, SOT-23
-20 V, -2.7 A

Features

- Leading −20 V Trench for Low $R_{DS(on)}$
- −1.8 V Rated for Low Voltage Gate Drive
- These Devices are Pb−Free, Halogen Free/BFR Free and are RoHS Compliant

Applications

- Power Load Switch

MAXIMUM RATINGS (T_J = 25°C unless otherwise stated)

Parameter			Symbol	Value	Unit
Drain−to−Source Voltage			V_{DSS}	−20	V
Gate−to−Source Voltage			V_{GS}	±8	V
Continuous Drain Current (Note 1)	Steady State	T_A = 25°C	I_D	−2.5	A
		T_A = 85°C		−1.8	
	t ≤ 10 s	T_A = 25°C		−2.7	
Power Dissipation (Note 1)	Steady State	T_A = 25°C	P_D	0.72	W
	t ≤ 10 s			0.81	
Continuous Drain Current (Note 2)	Steady State	T_A = 25°C	I_D	−1.9	A
		T_A = 85°C		−1.4	
Power Dissipation (Note 2)		T_A = 25°C	P_D	0.42	W
Pulsed Drain Current	t_p = 10 μs		I_{DM}	−10	A
ESD HBM, JESD22−A114 (Note 3)			V_{ESD}	1000	V
Operating Junction and Storage Temperature			T_J, T_{STG}	−55 to 150	°C
Source Current (Body Diode)			I_S	−1.1	A
Lead Temperature for Soldering Purposes (1/8 in 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 RATINGS

Parameter	Symbol	Max	Unit
Junction−to−Ambient − Steady State (Note 1)	$R_{\theta JA}$	175	°C/W
Junction−to−Ambient − t ≤ 10 s (Note 1)	$R_{\theta JA}$	155	
Junction−to−Ambient − Steady State (Note 2)	$R_{\theta JA}$	301	

1. Surface−mounted on FR4 board using 1 in sq. pad size (Cu area = 727 mm sq., 1 oz).
2. Surface−mounted on FR4 board using minimum pad size (Cu area = 3.8 mm sq., 1 oz).
3. ESD Rating: HBM Class 1C

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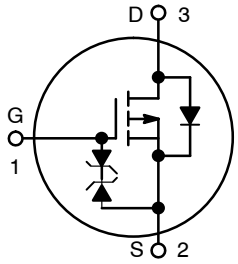
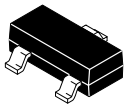
$V_{(BR)DSS}$	$R_{DS(on)}$ Max	I_D MAX
−20 V	77 mΩ @ −4.5 V	−2.7 A
	105 mΩ @ −2.5 V	
	160 mΩ @ −1.8 V	

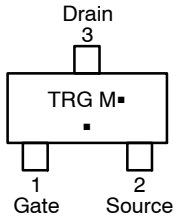
P−Channel MOSFET



MARKING DIAGRAM & PIN ASSIGNMENT



SOT−23
CASE 318
STYLE 21



TRG = Specific Device Code
M = Date Code*
▪ = Pb−Free Package

(Note: Microdot may be in either location)

*Date Code orientation may vary depending upon manufacturing location.

ORDERING INFORMATION

Device	Package	Shipping†
NTR3A085PZT1G	SOT−23 (Pb−Free)	3000 / 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.

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

Parameter	Symbol	Test Condition		Min	Typ	Max	Unit
OFF CHARACTERISTICS							
Drain−to−Source Breakdown Voltage	$V_{(BR)DSS}$	V_{GS} = 0 V, I_D = −250 μA		−20			V
Drain−to−Source Breakdown Voltage Temperature Coefficient	$V_{(BR)DSS}/T_J$	I_D = −250 μA, ref to 25°C			22		mV/°C
Zero Gate Voltage Drain Current	I_{DSS}	V_{GS} = 0 V, V_{DS} = −20 V	T_J = 25°C			−1	μA
			T_J = 125°C			−100	μA
Gate−to−Source Leakage Current	I_{GSS}	V_{DS} = 0 V, V_{GS} = ±8 V				±10	μA
ON CHARACTERISTICS (Note 4)							
Gate Threshold Voltage	$V_{GS(TH)}$	V_{GS} = V_{DS}, I_D = −250 μA		−0.4		−1.0	V
Negative Threshold Temperature Coefficient	$V_{GS(TH)}/T_J$				3.0		mV/°C
Drain−to−Source On Resistance	$R_{DS(on)}$	V_{GS} = −4.5 V	I_D = −1.6 A		54	77	mΩ
		V_{GS} = −2.5 V	I_D = −1.3 A		67	105	
		V_{GS} = −1.8 V	I_D = −0.9 A		87	160	
		V_{GS} = −1.5 V	I_D = −0.3 A		110		
Forward Transconductance	g_{FS}	V_{DS} = −5 V, I_D = −2.3 A			12		S
CHARGES AND CAPACITANCES							
Input Capacitance	C_{iss}	V_{GS} = 0 V, f = 1.0 MHz, V_{DS} = −10 V			586		pF
Output Capacitance	C_{oss}				81		
Reverse Transfer Capacitance	C_{rss}				72		
Total Gate Charge	$Q_{G(TOT)}$	V_{GS} = −4.5 V, V_{DS} = −10 V, I_D = −1.6 A			6.9		nC
Threshold Gate Charge	$Q_{G(TH)}$				0.5		
Gate−to−Source Charge	Q_{GS}				0.8		
Gate−to−Drain Charge	Q_{GD}				1.6		
SWITCHING CHARACTERISTICS (Note 5)							
Turn−On Delay Time	$t_{d(on)}$	V_{GS} = −4.5 V, V_{DS} = −10 V, I_D = −1.6 A, R_G = 6.0 Ω			6.8		ns
Rise Time	t_r				11		
Turn−Off Delay Time	$t_{d(off)}$				32		
Fall Time	t_f				23		
DRAIN−SOURCE DIODE CHARACTERISTICS							
Forward Diode Voltage	V_{SD}	V_{GS} = 0 V, I_S = −1.1 A	T_J = 25°C		−0.7	−1.2	V
			T_J = 125°C		−0.6		
Reverse Recovery Time	t_{RR}	V_{GS} = 0 V, dI_{SD}/dt = 100 A/μs, I_S = −1.6 A			11		ns
Charge Time	t_a				6.0		
Discharge Time	t_b				5.0		
Reverse Recovery Charge	Q_{RR}				3.6		nC

Product parametric performance is indicated in the Electrical Characteristics for the listed test conditions, unless otherwise noted. Product performance may not be indicated by the Electrical Characteristics if operated under different conditions.

4. Pulse Test: pulse width ≤ 300 ms, duty cycle ≤ 2%.
5. Switching characteristics are independent of operating junction temperatures.

TYPICAL CHARACTERISTICS

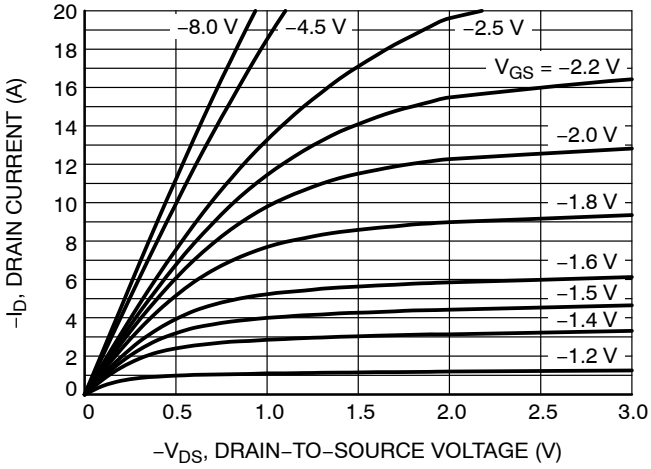

Figure 1. On−Region Characteristics

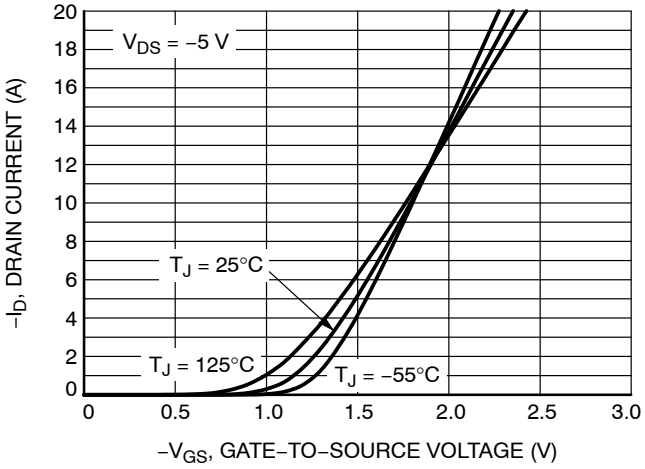

Figure 2. Transfer Characteristics

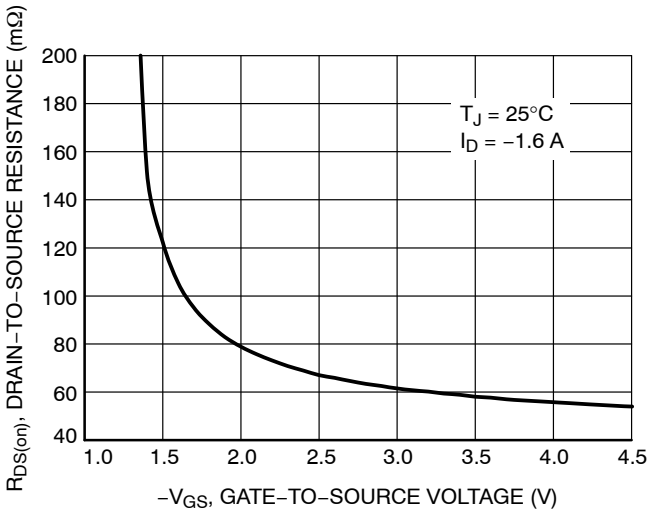

Figure 3. On−Resistance vs. Gate−to−Source Voltage

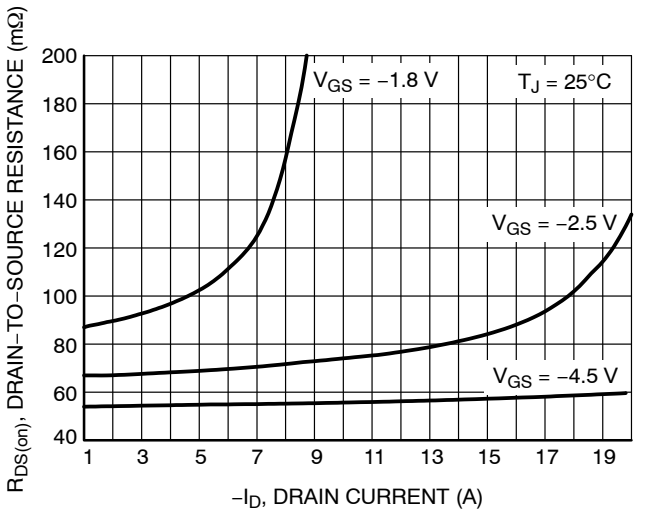

Figure 4. On−Resistance vs. Drain Current and Gate Voltage

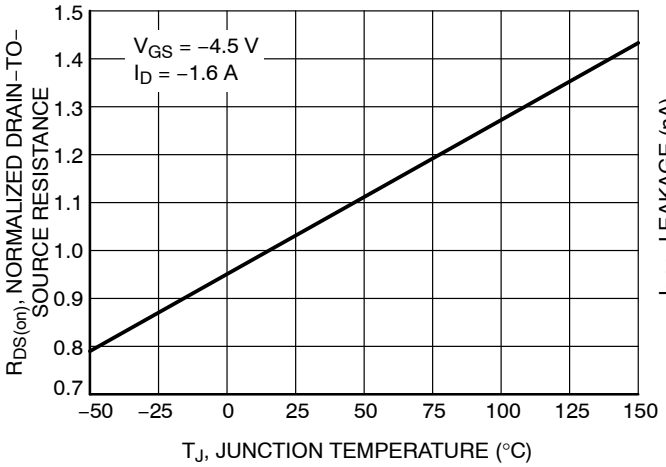

Figure 5. On−Resistance Variation with Temperature

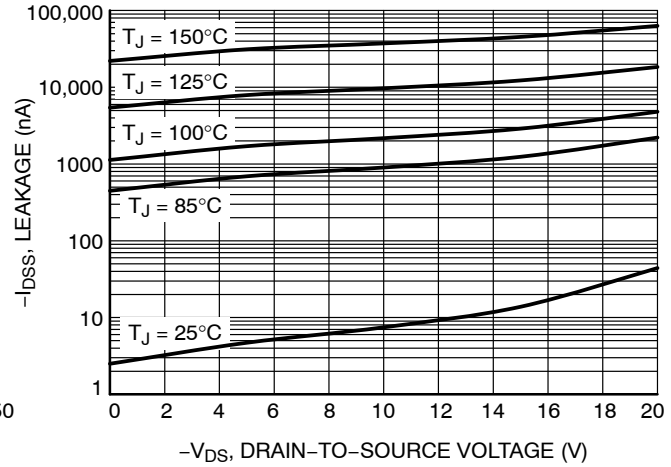

Figure 6. Drain−to−Source Leakage Current vs. Voltage

TYPICAL CHARACTERISTICS

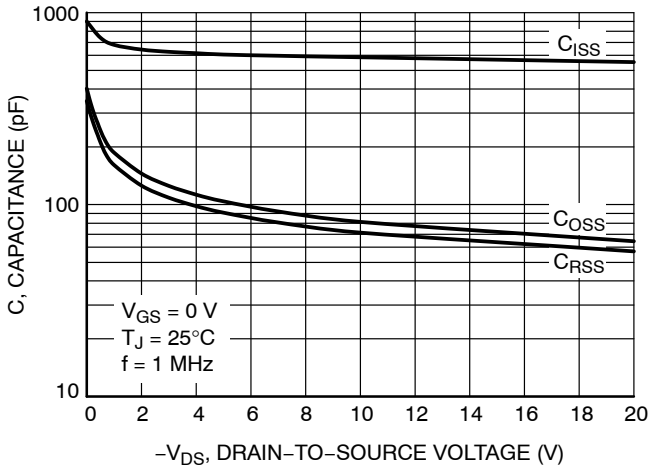

Figure 7. Capacitance Variation

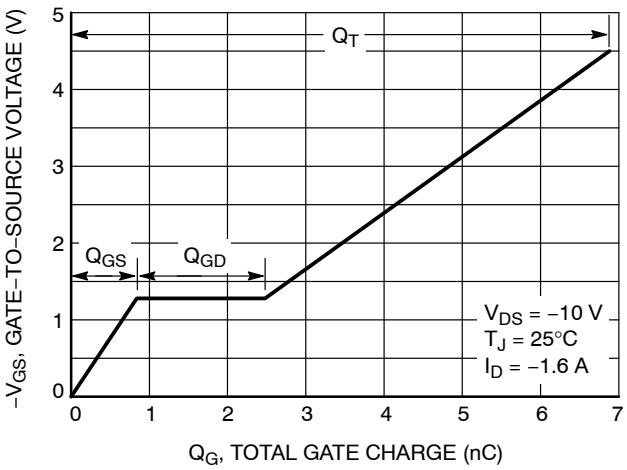

Figure 8. Gate−to−Source vs. Total Charge

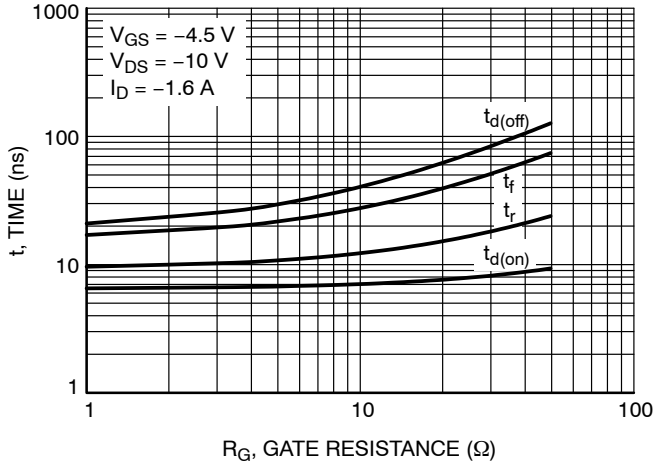

Figure 9. Resistive Switching Time Variation vs. Gate Resistance

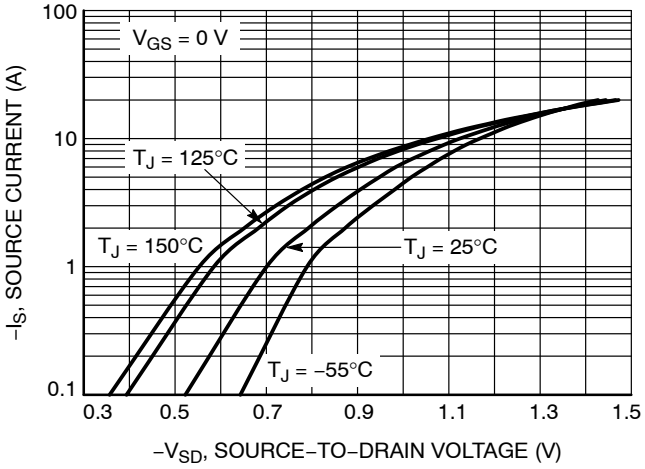

Figure 10. Diode Forward Voltage vs. Current

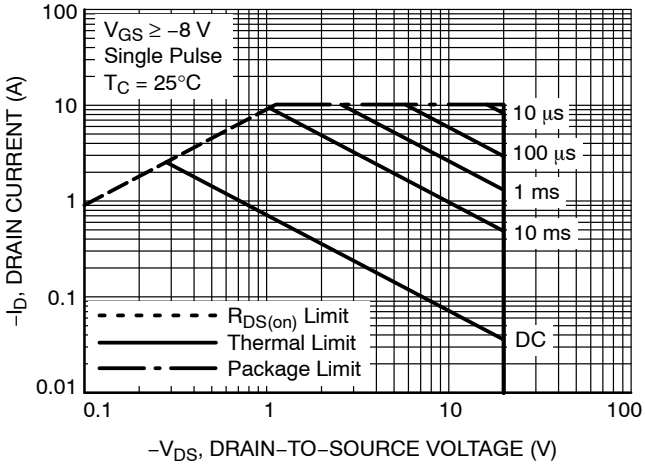

Figure 11. Maximum Rated Forward Biased Safe Operating Area

TYPICAL CHARACTERISTICS

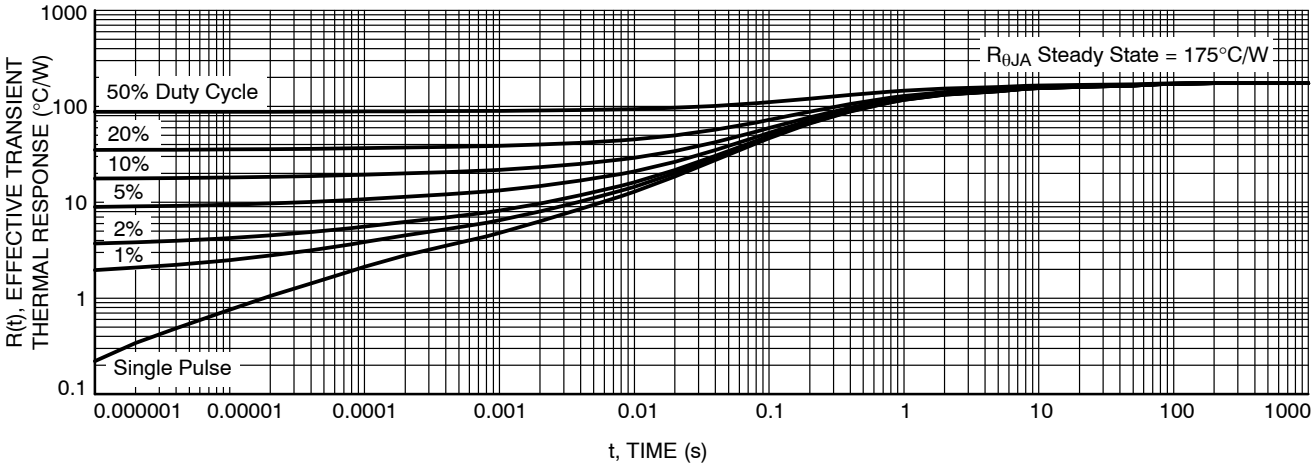

Figure 12. Thermal Impedance (Junction−to−Ambient)

MECHANICAL CASE OUTLINE
PACKAGE DIMENSIONS

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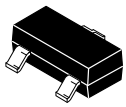
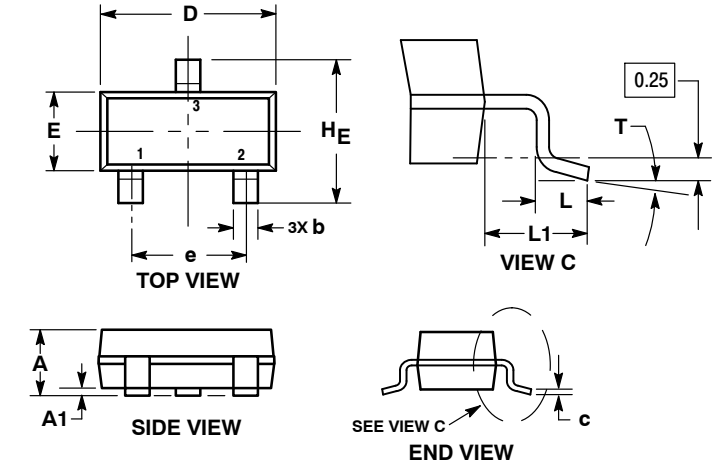


SOT−23 (TO−236)
CASE 318−08
ISSUE AS

DATE 30 JAN 2018

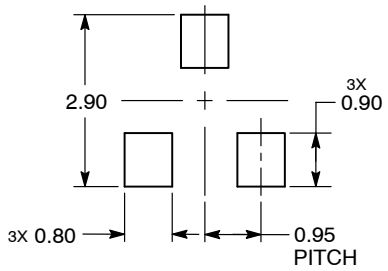
SCALE 4:1



NOTES:
1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M, 1994.
2. CONTROLLING DIMENSION: MILLIMETERS.
3. MAXIMUM LEAD THICKNESS INCLUDES LEAD FINISH. MINIMUM LEAD THICKNESS IS THE MINIMUM THICKNESS OF THE BASE MATERIAL.
4. DIMENSIONS D AND E DO NOT INCLUDE MOLD FLASH, PROTRUSIONS, OR GATE BURRS.

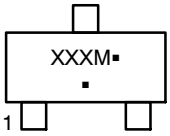
	MILLIMETERS			INCHES		
DIM	MIN	NOM	MAX	MIN	NOM	MAX
A	0.89	1.00	1.11	0.035	0.039	0.044
A1	0.01	0.06	0.10	0.000	0.002	0.004
b	0.37	0.44	0.50	0.015	0.017	0.020
c	0.08	0.14	0.20	0.003	0.006	0.008
D	2.80	2.90	3.04	0.110	0.114	0.120
E	1.20	1.30	1.40	0.047	0.051	0.055
e	1.78	1.90	2.04	0.070	0.075	0.080
L	0.30	0.43	0.55	0.012	0.017	0.022
L1	0.35	0.54	0.69	0.014	0.021	0.027
H_E	2.10	2.40	2.64	0.083	0.094	0.104
T	0°	−−−	10°	0°	−−−	10°

RECOMMENDED SOLDERING FOOTPRINT



DIMENSIONS: MILLIMETERS

GENERIC MARKING DIAGRAM*



XXX = Specific Device Code
M = Date Code
▪ = 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.

STYLE 1 THRU 5:
CANCELLED

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

STYLE 7:
PIN 1. EMITTER
2. BASE
3. COLLECTOR

STYLE 8:
PIN 1. ANODE
2. NO CONNECTION
3. CATHODE

STYLE 9:
PIN 1. ANODE
2. ANODE
3. CATHODE

STYLE 10:
PIN 1. DRAIN
2. SOURCE
3. GATE

STYLE 11:
PIN 1. ANODE
2. CATHODE
3. CATHODE−ANODE

STYLE 12:
PIN 1. CATHODE
2. CATHODE
3. ANODE

STYLE 13:
PIN 1. SOURCE
2. DRAIN
3. GATE

STYLE 14:
PIN 1. CATHODE
2. GATE
3. ANODE

STYLE 15:
PIN 1. GATE
2. CATHODE
3. ANODE

STYLE 16:
PIN 1. ANODE
2. CATHODE
3. CATHODE

STYLE 17:
PIN 1. NO CONNECTION
2. ANODE
3. CATHODE

STYLE 18:
PIN 1. NO CONNECTION
2. CATHODE
3. ANODE

STYLE 19:
PIN 1. CATHODE
2. ANODE
3. CATHODE−ANODE

STYLE 20:
PIN 1. CATHODE
2. ANODE
3. GATE

STYLE 21:
PIN 1. GATE
2. SOURCE
3. DRAIN

STYLE 22:
PIN 1. RETURN
2. OUTPUT
3. INPUT

STYLE 23:
PIN 1. ANODE
2. ANODE
3. CATHODE

STYLE 24:
PIN 1. GATE
2. DRAIN
3. SOURCE

STYLE 25:
PIN 1. ANODE
2. CATHODE
3. GATE

STYLE 26:
PIN 1. CATHODE
2. ANODE
3. NO CONNECTION

STYLE 27:
PIN 1. CATHODE
2. CATHODE
3. CATHODE

STYLE 28:
PIN 1. ANODE
2. ANODE
3. ANODE

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