

# NTR3A30PZ

## MOSFET – Power, Single P-Channel, SOT-23, 2.4 x 2.9 x 1.0 mm

**-20 V, -5.5 A**

### Features

- Low  $R_{DS(on)}$  Solution in 2.4 mm x 2.9 mm Package
- ESD Diode–Protected Gate
- These Devices are Pb–Free, Halogen Free/BFR Free and are RoHS Compliant

### Applications

- High Side Load Switch
- Battery Switch
- Optimized for Power Management Applications for Portable Products, such as Smart Phones, Media Tablets, PMP, DSC, GPS, and Others

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

Parameter			Symbol	Value	Unit
Drain-to–Source Voltage			$V_{DS}$	–20	V
Gate-to–Source Voltage			$V_{GS}$	±8	V
Drain Current (Note 1)	Steady State	$T_A = 25^{\circ}\text{C}$	$I_D$	–3.0	A
Drain Current (Note 1)		$T_A = 85^{\circ}\text{C}$		–2.2	
	$t \leq 5 \text{ s}$	$T_A = 25^{\circ}\text{C}$		–5.5	
Power Dissipation (Note 1)	Steady State	$T_A = 25^{\circ}\text{C}$	$P_D$	0.48	W
	$t \leq 5 \text{ s}$			1.58	
Pulsed Drain Current	$t_p = 10 \mu\text{s}$		$I_{DM}$	–9.1	A
Operating Junction and Storage Temperature			$T_J, T_{STG}$	–55 to 150	$^{\circ}\text{C}$
ESD HBM, JESD22–A114			$V_{ESD}$	2000	V
Source Current (Body Diode) (Note 2)			$I_S$	–0.48	A
Lead Temperature for Soldering Purposes (1/8 in from case for 10 s)			$T_L$	260	$^{\circ}\text{C}$

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)	$R_{\theta JA}$	260	$^\circ\text{C/W}$
Junction-to–Ambient – $t \leq 5 \text{ s}$ (Note 1)	$R_{\theta JA}$	79	

1. Surface-mounted on FR4 board using 1 in sq. pad size (Cu area = 1.127 in sq. [2 oz] including traces).
2. Pulse Test: pulse width  $\leq 300 \text{ ms}$ , duty cycle  $\leq 2\%$ .

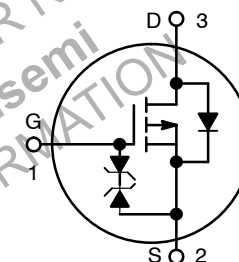


ON Semiconductor®

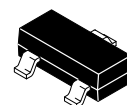
[www.onsemi.com](http://www.onsemi.com)

$V_{(BR)DSS}$	$R_{DS(on)}$ Max	$I_D$ MAX
–20 V	38 m $\Omega$ @ –4.5 V	–5.5 A
	50 m $\Omega$ @ –2.5 V	
	73 m $\Omega$ @ –1.8 V	

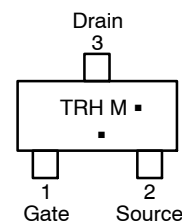
### P–Channel MOSFET



### MARKING DIAGRAM & PIN ASSIGNMENT



SOT-23  
CASE 318  
STYLE 21



TRH = 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†
NTR3A30PZT1G	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.

# NTR3A30PZ

## ELECTRICAL CHARACTERISTICS ( $T_J = 25^\circ\text{C}$ unless otherwise specified)

Parameter	Symbol	Test Condition	Min	Typ	Max	Unit
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### OFF CHARACTERISTICS

Drain-to-Source Breakdown Voltage	$V_{(BR)DSS}$	$V_{GS} = 0\text{ V}, I_D = 250\text{ }\mu\text{A}$	-20			V
Drain-to-Source Breakdown Voltage Temperature Coefficient	$V_{(BR)DSS}/T_J$	$I_D = -250\text{ }\mu\text{A}$ , ref to $25^\circ\text{C}$		10.5		mV/ $^\circ\text{C}$
Zero Gate Voltage Drain Current	$I_{DSS}$	$V_{GS} = 0\text{ V}, V_{DS} = -20\text{ V}$ $T_J = 25^\circ\text{C}$			-1	$\mu\text{A}$
Gate-to-Source Leakage Current	$I_{GSS}$	$V_{DS} = 0\text{ V}, V_{GS} = \pm 5\text{ V}$			$\pm 10$	$\mu\text{A}$

### ON CHARACTERISTICS (Note 3)

Gate Threshold Voltage	$V_{GS(TH)}$	$V_{GS} = V_{DS}, I_D = -250\text{ }\mu\text{A}$	-0.4	-0.65	-1.0	V
Negative Threshold Temperature Coefficient	$V_{GS(TH)}/T_J$			10.5		mV/ $^\circ\text{C}$
Drain-to-Source On Resistance	$R_{DS(on)}$	$V_{GS} = -4.5\text{ V}, I_D = -3\text{ A}$		31	38	m $\Omega$
		$V_{GS} = -2.5\text{ V}, I_D = -2.5\text{ A}$		36	50	
		$V_{GS} = -1.8\text{ V}, I_D = -1.5\text{ A}$		51	73	
Forward Transconductance	$g_{FS}$	$V_{DS} = -5\text{ V}, I_D = -3\text{ A}$		30		S

### CHARGES AND CAPACITANCES

Input Capacitance	$C_{iss}$	$V_{GS} = 0\text{ V}, f = 1.0\text{ MHz}, V_{DS} = -15\text{ V}$		1651		pF
Output Capacitance	$C_{oss}$			148		
Reverse Transfer Capacitance	$C_{rss}$			129		
Total Gate Charge	$Q_{G(TOT)}$	$V_{GS} = -4.5\text{ V}, V_{DS} = -15\text{ V}, I_D = -3\text{ A}$		17.6		nC
Threshold Gate Charge	$Q_{G(TH)}$			0.7		
Gate-to-Source Charge	$Q_{GS}$			2.4		
Gate-to-Drain Charge	$Q_{GD}$			4.9		

### SWITCHING CHARACTERISTICS (Note 4)

Turn-On Delay Time	$t_{d(on)}$	$V_{GS} = -4.5\text{ V}, V_{DS} = -15\text{ V}, I_D = -3\text{ A}, R_G = 6.0\text{ }\Omega$		100		ns
Rise Time	$t_r$			208		
Turn-Off Delay Time	$t_{d(off)}$			1043		
Fall Time	$t_f$			552		

### DRAIN-SOURCE DIODE CHARACTERISTICS

Forward Diode Voltage	$V_{SD}$	$V_{GS} = 0\text{ V}, I_S = -0.4\text{ A}$	$T_J = 25^\circ\text{C}$		0.65	1.0	V
			$T_J = 125^\circ\text{C}$		0.47		

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.

3. Pulse Test: pulse width  $\leq 300\text{ ms}$ , duty cycle  $\leq 2\%$ .

4. Switching characteristics are independent of operating junction temperatures.

TYPICAL CHARACTERISTICS

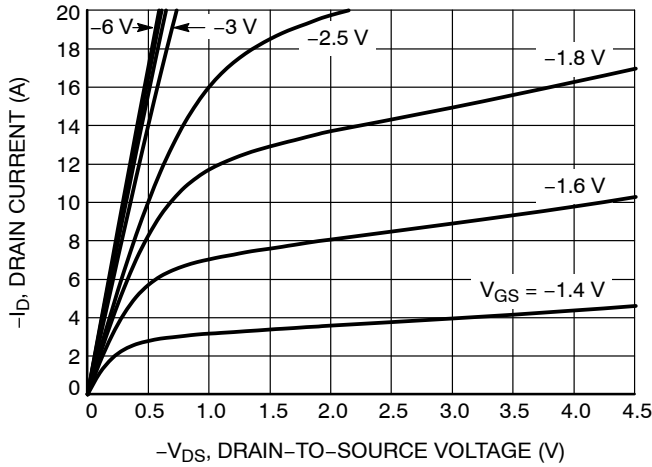


Figure 1. On-Region Characteristics

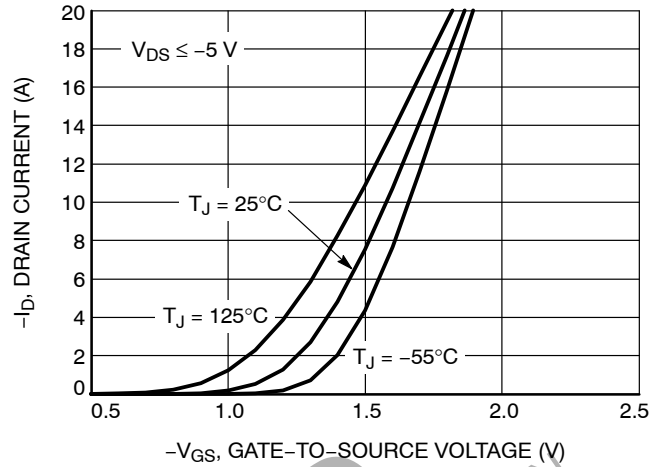


Figure 2. Transfer Characteristics

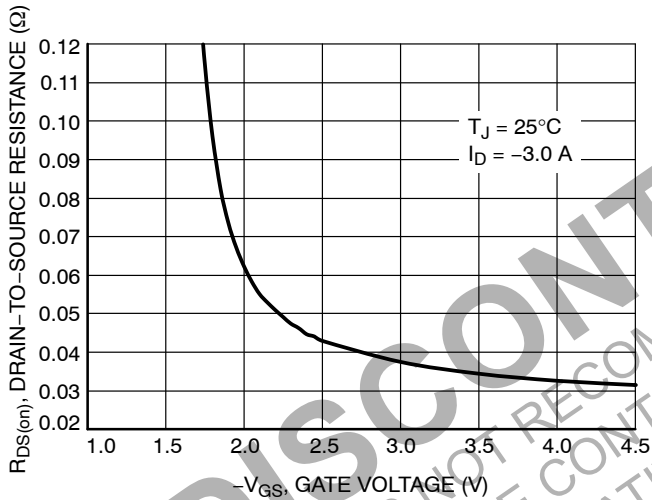


Figure 3. On-Resistance vs. Gate-to-Source Voltage

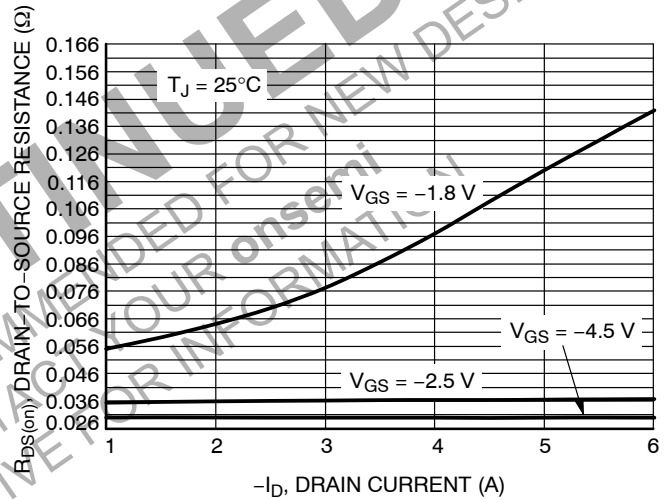


Figure 4. On-Resistance vs. Drain Current and Gate Voltage

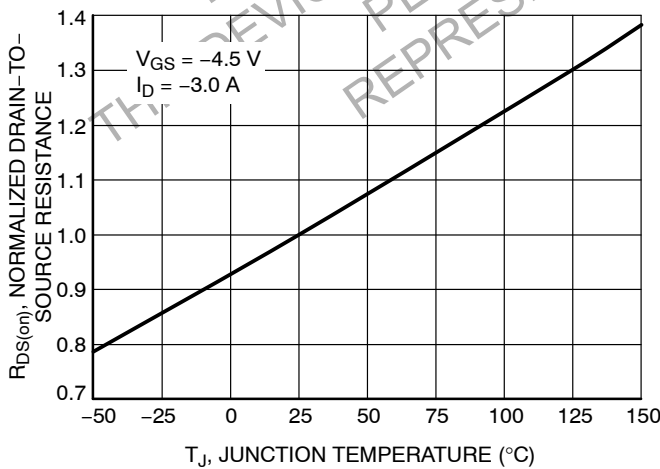


Figure 5. On-Resistance Variation with Temperature

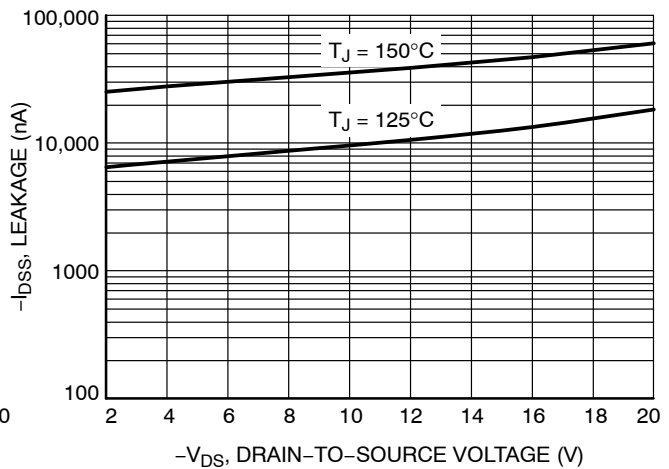


Figure 6. Drain-to-Source Leakage Current vs. Voltage

TYPICAL CHARACTERISTICS

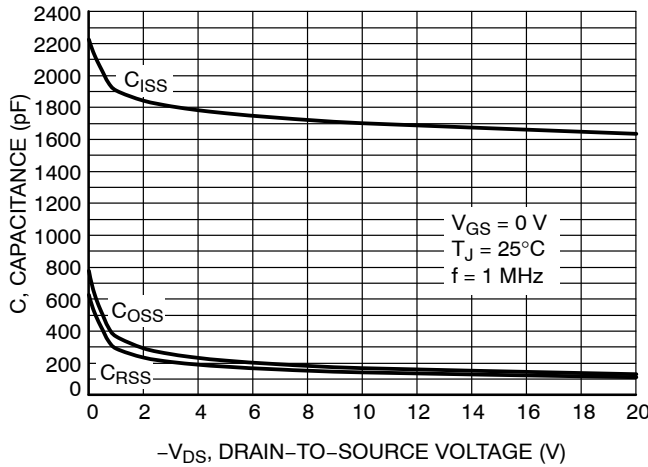


Figure 7. Capacitance Variation

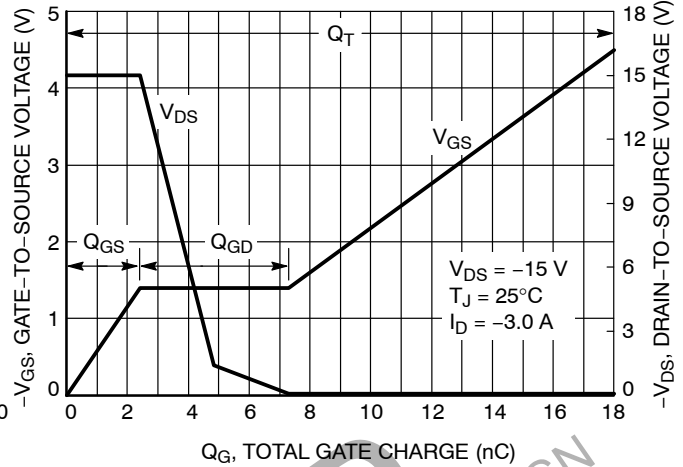


Figure 8. Gate-to-Source and Drain-to-Source Voltage vs. Total Charge

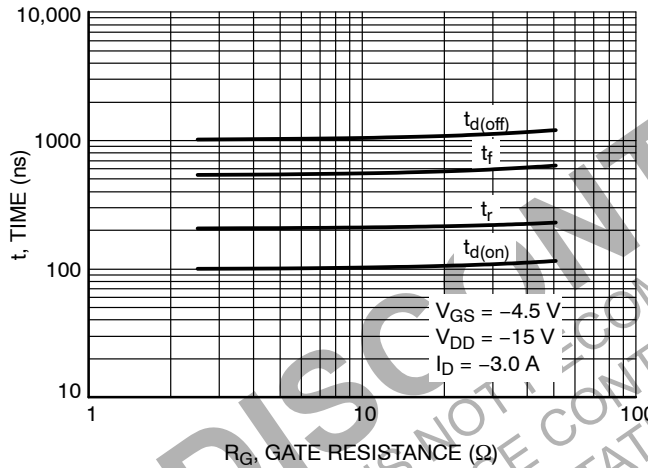


Figure 9. Resistive Switching Time Variation vs. Gate Resistance

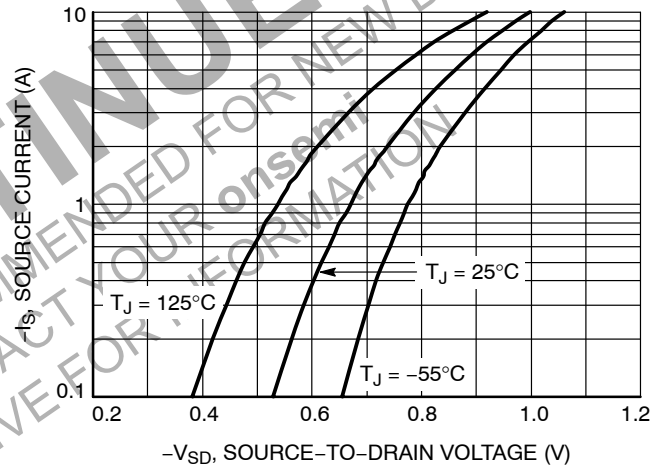


Figure 10. Diode Forward Voltage vs. Current

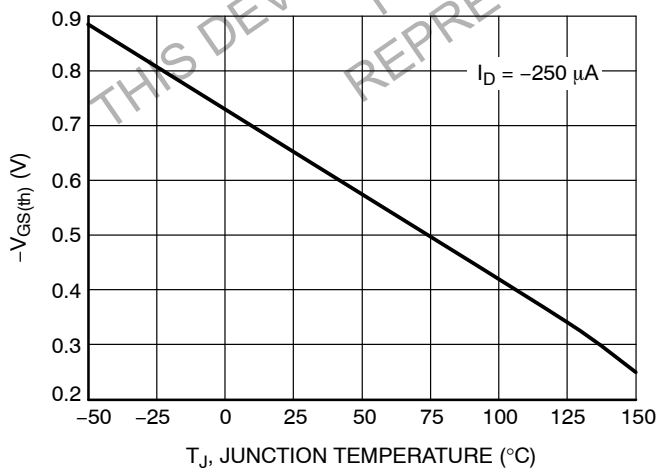


Figure 11. Threshold Voltage

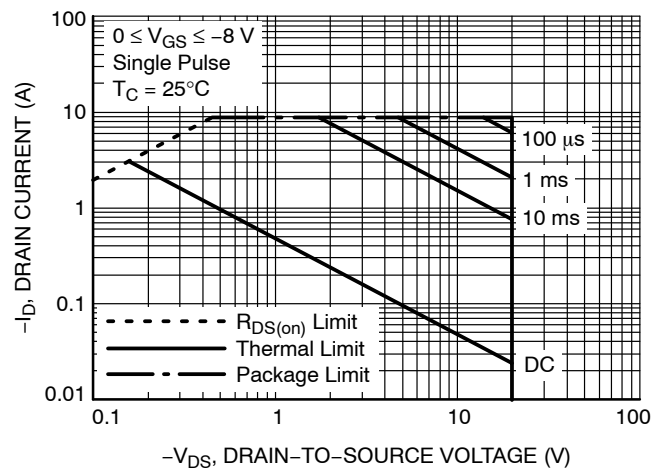


Figure 12. Maximum Rated Forward Biased Safe Operating Area

# NTR3A30PZ

## TYPICAL CHARACTERISTICS

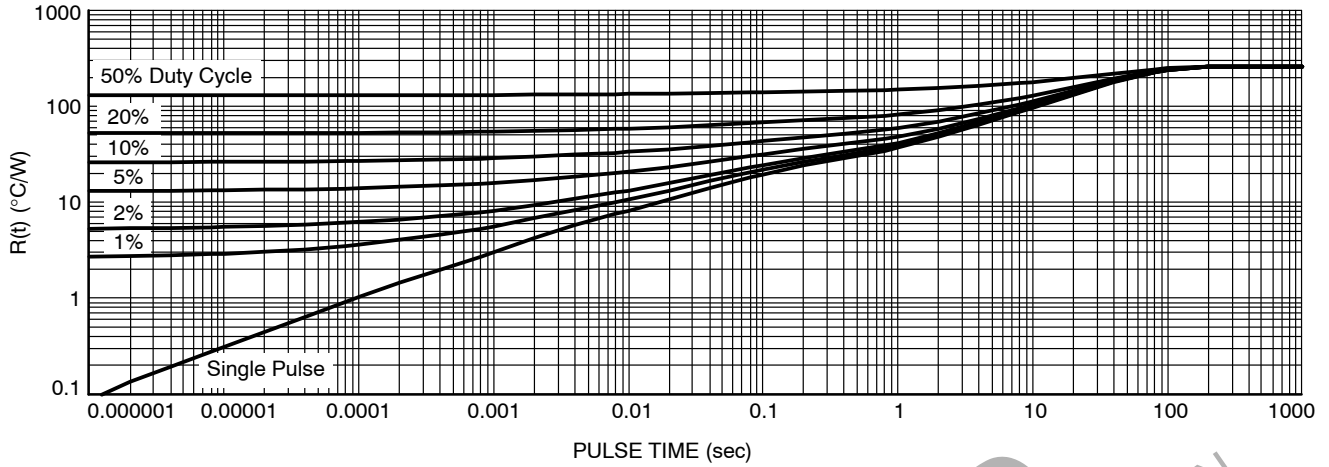


Figure 13. FET Thermal Response

**DISCONTINUED**  
THIS DEVICE IS NOT RECOMMENDED FOR NEW DESIGN  
PLEASE CONTACT YOUR onsemi  
REPRESENTATIVE FOR INFORMATION



SCALE 4:1

**SOT-23 (TO-236) 2.90x1.30x1.00 1.90P**  
**CASE 318**  
**ISSUE AU**

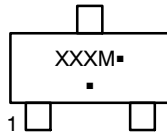
DATE 14 AUG 2024



MILLIMETERS			
DIM	MIN	NOM	MAX
A	0.89	1.00	1.11
A1	0.01	0.06	0.10
b	0.37	0.44	0.50
c	0.08	0.14	0.20
D	2.80	2.90	3.04
E	1.20	1.30	1.40
e	1.78	1.90	2.04
L	0.30	0.43	0.55
L1	0.35	0.54	0.69
HE	2.10	2.40	2.64
T	0°	---	10°

## NOTES:

1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M, 2018.
2. CONTROLLING DIMENSIONS: 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.

**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. 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 onsemi Soldering and Mounting Techniques Reference Manual, SOLDERM/D.

**STYLES ON PAGE 2**

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**ISSUE AU**

DATE 14 AUG 2024

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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