

# MOSFET – Single P-Channel, Small Signal, SOT-23

**-8.0 V, -3.7 A**

## NTR2101P

### Features

- Leading Trench Technology for Low  $R_{DS(on)}$
- -1.8 V Rated for Low Voltage Gate Drive
- SOT-23 Surface Mount for Small Footprint (3 x 3 mm)
- This is a Pb-Free Device

### Applications

- High Side Load Switch
- DC-DC Conversion
- Cell Phone, Notebook, PDAs, etc.

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

Symbol	Parameter			Value	Unit
$V_{DSS}$	Drain-to-Source Voltage			-8.0	V
$V_{GS}$	Gate-to-Source Voltage			$\pm 8.0$	V
$I_D$	Continuous Drain Current (Note 1)	$t \leq 5 \text{ s}$	$T_A = 25^\circ\text{C}$	-3.7	A
			$T_A = 70^\circ\text{C}$	-3.0	
$P_D$	Power Dissipation (Note 1)	$t \leq 5 \text{ s}$		0.96	W
$I_{DM}$	Pulsed Drain Current	$t_p = 10 \mu\text{s}$		-11	A
$T_J, T_{STG}$	Operating Junction and Storage Temperature			-55 to 150	$^\circ\text{C}$
$I_S$	Source Current (Body Diode)			-1.2	A
$T_L$	Lead Temperature for Soldering Purposes (1/8" from case for 10 s)			260	$^\circ\text{C}$

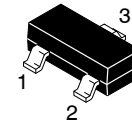
Stresses exceeding those listed in the Maximum Ratings table may damage the device. If any of these limits are exceeded, device functionality should not be assumed, damage may occur and reliability may be affected.

### THERMAL RESISTANCE RATINGS

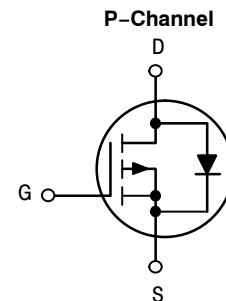
Parameter	Symbol	Max	Unit
Junction-to-Ambient – Steady State	$R_{\theta JA}$	160	$^\circ\text{C/W}$
Junction-to-Ambient – $t \leq 5 \text{ s}$	$R_{\theta JA}$	130	

1. Surface mounted on FR4 board using 1 in sq pad size (Cu area = 1.127 in sq [1 oz] including traces).

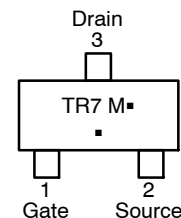
$V_{(BR)DSS}$	$R_{DS(on)}$ Typ	$I_D$ Max
-8.0 V	39 m $\Omega$ @ -4.5 V	-3.7 A
	52 m $\Omega$ @ -2.5 V	
	79 m $\Omega$ @ -1.8 V	



**SOT-23  
CASE 318  
STYLE 21**



### MARKING DIAGRAM & PIN ASSIGNMENT



- TR7 = Specific Device Code  
M = Date Code\*  
▪ = Pb-Free Package

(Note: Microdot may be in either location)  
\*For additional marking information, refer to

Application Note [AND8002/D](#).

### ORDERING INFORMATION

Device	Package	Shipping†
NTR2101PT1G	SOT-23 (Pb-Free)	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](#).

# NTR2101P

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

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

$V_{(BR)DSS}$	Drain-to-Source Breakdown Voltage	$V_{GS} = 0\text{ V}, I_D = -250\text{ }\mu\text{A}$	-8.0			V
$V_{(BR)DSS}/T_J$	Drain-to-Source Breakdown Voltage Temperature Coefficient			10		mV/ $^\circ\text{C}$
$I_{DSS}$	Zero Gate Voltage Drain Current	$V_{GS} = 0\text{ V}, V_{DS} = -6.4\text{ V}$	$T_J = 25^\circ\text{C}$		-1.0	$\mu\text{A}$
			$T_J = 125^\circ\text{C}$		-100	
$I_{GSS}$	Gate-to-Source Leakage Current	$V_{DS} = 0\text{ V}, V_{GS} = \pm 8.0\text{ V}$			$\pm 100$	nA

### ON CHARACTERISTICS (Note 2)

$V_{GS(TH)}$	Gate Threshold Voltage	$V_{GS} = V_{DS}, I_D = -250\text{ }\mu\text{A}$	-0.40		-1.0	V
$V_{GS(TH)}/T_J$	Negative Threshold Temperature Coefficient			2.7		mV/ $^\circ\text{C}$
$R_{DS(on)}$	Drain-to-Source On Resistance	$V_{GS} = -4.5\text{ V}, I_D = -3.5\text{ A}$		39	52	m $\Omega$
		$V_{GS} = -2.5\text{ V}, I_D = -3.0\text{ A}$		52	72	
		$V_{GS} = -1.8\text{ V}, I_D = -2.0\text{ A}$		79	120	
$g_{FS}$	Forward Transconductance	$V_{GS} = -5.0\text{ V}, I_D = -3.5\text{ A}$		9.0		S

### CHARGES AND CAPACITANCES

$C_{ISS}$	Input Capacitance	$V_{GS} = 0\text{ V}, f = 1.0\text{ MHz}, V_{DS} = -4.0\text{ V}$		1173		pF
$C_{OSS}$	Output Capacitance			289		
$C_{RSS}$	Reverse Transfer Capacitance			218		
$Q_{G(TOT)}$	Total Gate Charge	$V_{GS} = -4.5\text{ V}, V_{DS} = -4.0\text{ V}, I_D = -3.5\text{ A}$		12	15	nC
$Q_{GS}$	Gate-to-Source Charge			3.8		
$Q_{GD}$	Gate-to-Drain Charge			2.5		

### SWITCHING CHARACTERISTICS (Note 3)

$t_{d(on)}$	Turn-On Delay Time	$V_{GS} = -4.5\text{ V}, V_{DD} = -4.0\text{ V}, I_D = -1.2\text{ A}, R_G = 6.0\text{ }\Omega$		7.4	15	ns
$t_r$	Rise Time			15.75	25	
$t_{d(off)}$	Turn-Off Delay Time			38	58	
$t_f$	Fall Time			31	51	

### DRAIN-SOURCE DIODE CHARACTERISTICS

$V_{SD}$	Forward Diode Voltage	$V_{GS} = 0\text{ V}, I_S = -1.2\text{ A}$	$T_J = 25^\circ\text{C}$		-0.73	-1.2	V
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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.

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

3. Switching characteristics are independent of operating junction temperatures.

TYPICAL CHARACTERISTICS

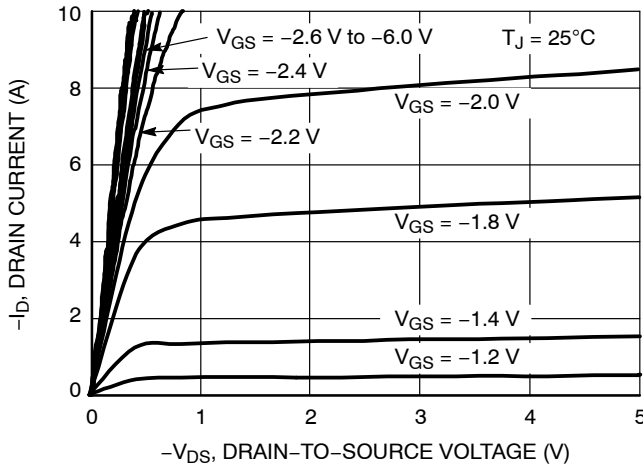


Figure 1. On-Region Characteristics

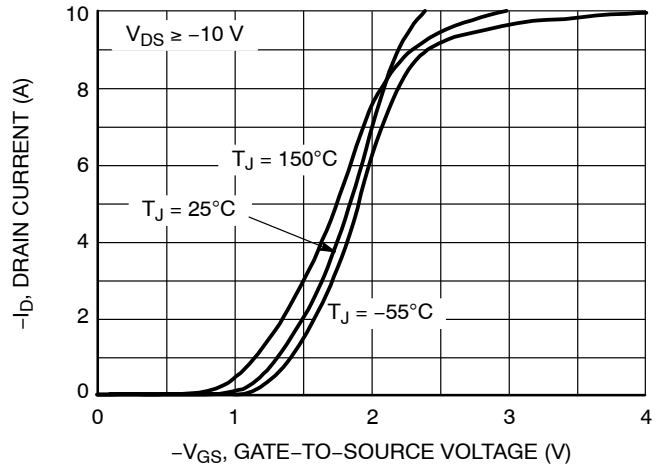


Figure 2. Transfer Characteristics

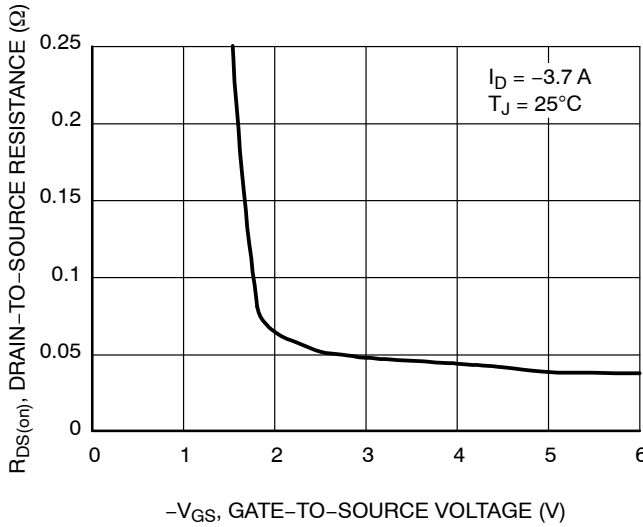


Figure 3. On-Resistance versus Gate-to-Source Voltage

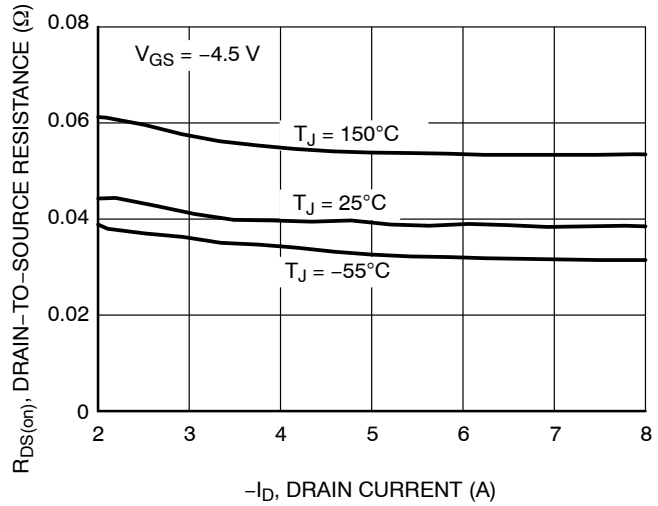


Figure 4. On-Resistance versus Drain Current and Gate Voltage

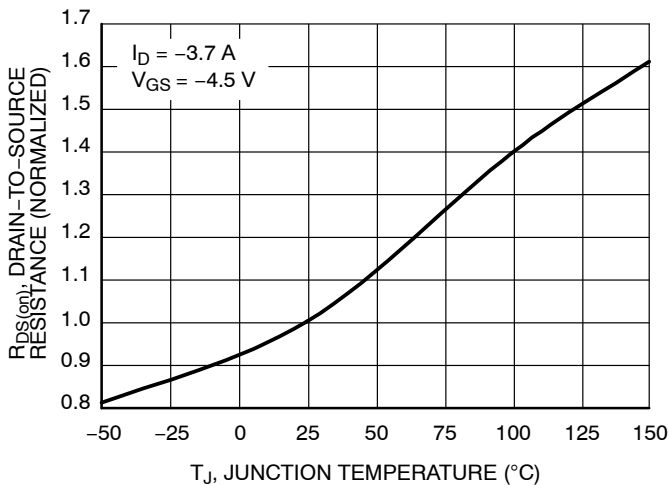


Figure 5. On-Resistance Variation with Temperature

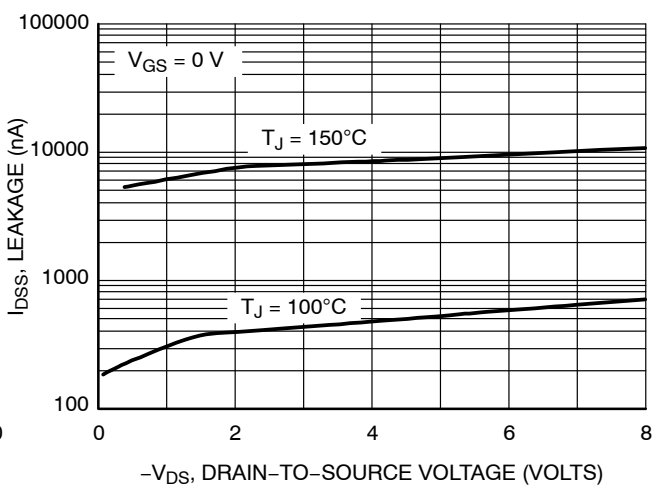
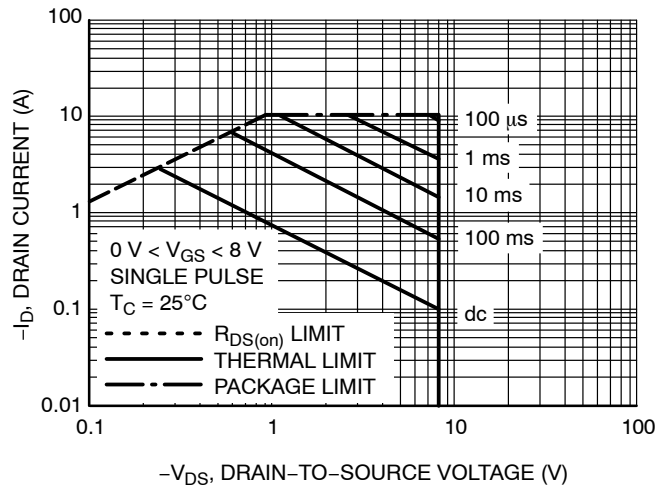
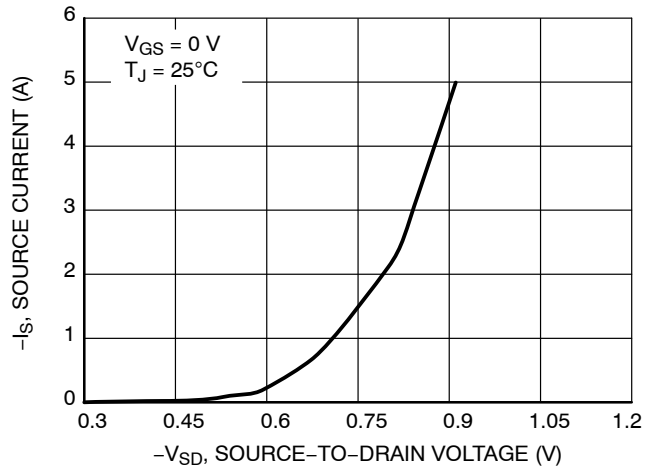
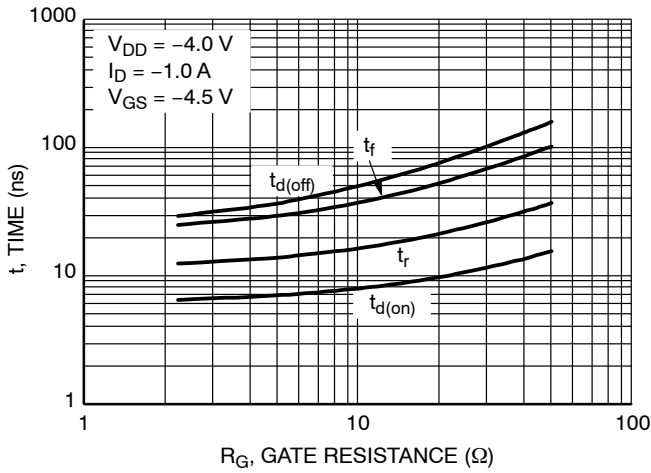
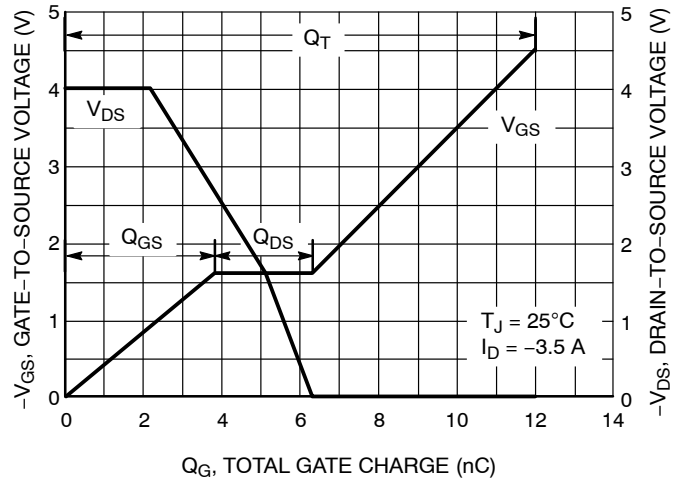
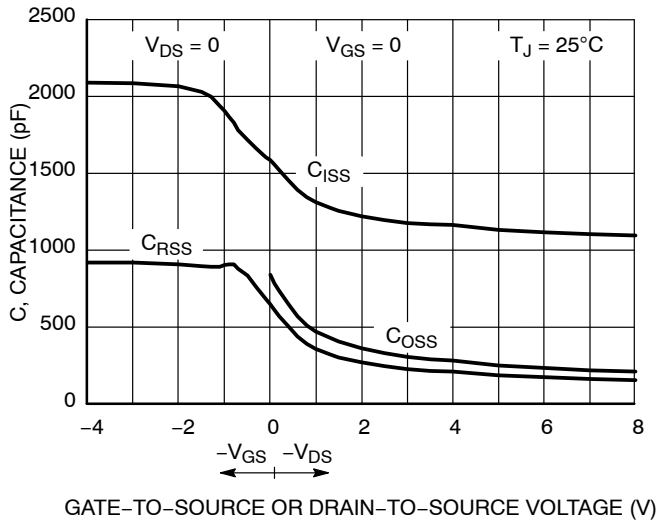


Figure 6. Drain-to-Source Leakage Current versus Voltage

Typical Characteristics (continued)



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## TYPICAL CHARACTERISTICS (continued)

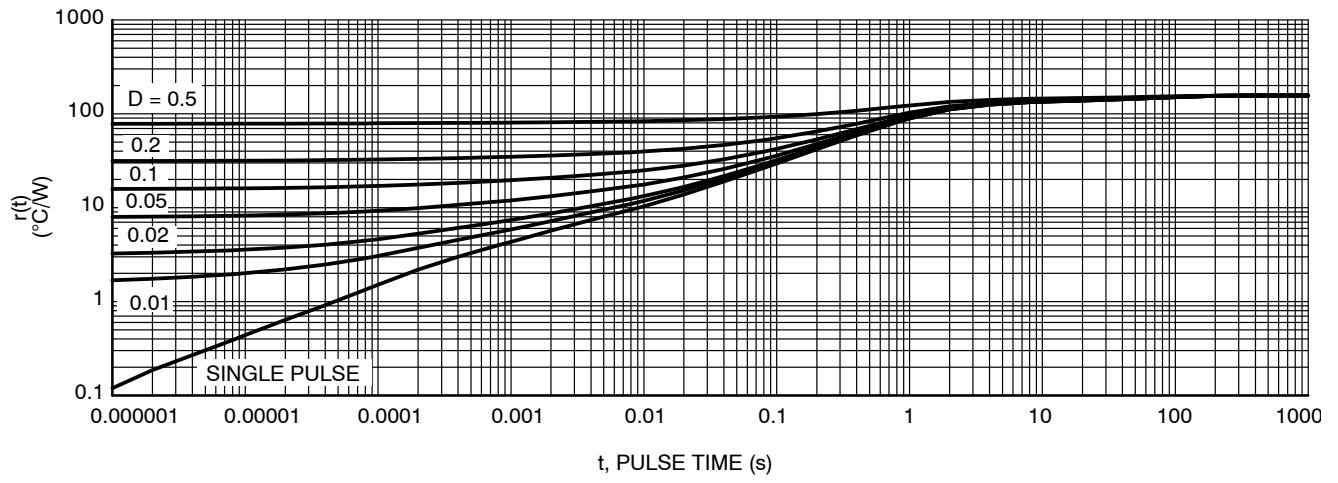


Figure 12. Thermal Response



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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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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