

MOSFET – Power, N-Channel, SOT-23 200 mA, 50 V

BSS138L, BVSS138L

Typical applications are DC-DC converters, power management in portable and battery-powered products such as computers, printers, PCMCIA cards, cellular and cordless telephones.

Features

- Low Threshold Voltage ($V_{GS(th)}$: 0.85 V–1.5 V) Makes it Ideal for Low Voltage Applications
- Miniature SOT-23 Surface Mount Package Saves Board Space
- HBM Class 0A, MM Class M1A, CDM Class IV (Note 3)
- BVSS Prefix for Automotive and Other Applications Requiring Unique Site and Control Change Requirements; AEC-Q101 Qualified and PPAP Capable
- These Devices are Pb-Free, Halogen Free/BFR Free and are RoHS Compliant

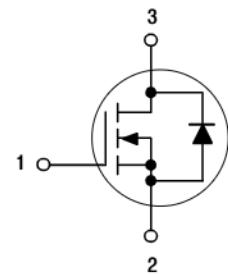
MAXIMUM RATINGS ($T_A = 25^\circ\text{C}$ unless otherwise noted)

Rating	Symbol	Value	Unit
Drain-to-Source Voltage	V_{DSS}	50	Vdc
Gate-to-Source Voltage – Continuous	V_{GS}	± 20	Vdc
Drain Current			mA
– Continuous @ $T_A = 25^\circ\text{C}$	I_D	200	
– Pulsed Drain Current ($t_p \leq 10 \mu\text{s}$)	I_{DM}	800	
Total Power Dissipation @ $T_A = 25^\circ\text{C}$	P_D	225	mW
Operating and Storage Temperature Range	T_J, T_{stg}	– 55 to 150	°C
Thermal Resistance, Junction-to-Ambient	$R_{J\text{A}}$	556	°C/W
Maximum Lead Temperature for Soldering Purposes, for 10 seconds	T_L	260	°C

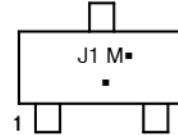
Stresses exceeding those listed in the Maximum Ratings table may damage the device. If any of these limits are exceeded, device functionality should not be assumed, damage may occur and reliability may be affected.

200 mA, 50 V
 $R_{DS(on)} = 3.5 \Omega$

N-Channel



MARKING DIAGRAM



J1 = Device Code
M = Date Code*
▪ = Pb-Free Package

(Note: Microdot may be in either location)

*Date Code orientation and/or overbar may vary depending upon manufacturing location.

ORDERING INFORMATION

Device	Package	Shipping [†]
BSS138LT1G, BVSS138LT1G	SOT-23 (Pb-Free)	3,000 / Tape & Reel
BSS138LT7G	SOT-23 (Pb-Free)	3,500 / Tape & Reel
BSS138LT3G, BVSS138LT3G	SOT-23 (Pb-Free)	10,000 / 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.

BSS138L, BVSS138L

ELECTRICAL CHARACTERISTICS ($T_A = 25^\circ\text{C}$ unless otherwise noted)

Characteristic	Symbol	Min	Typ	Max	Unit
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OFF CHARACTERISTICS

Drain-to-Source Breakdown Voltage ($V_{GS} = 0$ Vdc, $I_D = 250$ μAdc)	$V_{(\text{BR})\text{DSS}}$	50	–	–	Vdc
Zero Gate Voltage Drain Current ($V_{DS} = 25$ Vdc, $V_{GS} = 0$ Vdc, 25°C) ($V_{DS} = 50$ Vdc, $V_{GS} = 0$ Vdc, 25°C) ($V_{DS} = 50$ Vdc, $V_{GS} = 0$ Vdc, 150°C)	I_{DSS}	– – –	– – –	0.1 0.5 5.0	μAdc
Gate-Source Leakage Current ($V_{GS} = \pm 20$ Vdc, $V_{DS} = 0$ Vdc)	I_{GSS}	–	–	± 0.1	μAdc

ON CHARACTERISTICS (Note 1)

Gate-Source Threshold Voltage ($V_{DS} = V_{GS}$, $I_D = 1.0$ mAdc)	$V_{GS(\text{th})}$	0.85	–	1.5	Vdc
Static Drain-to-Source On-Resistance ($V_{GS} = 2.75$ Vdc, $I_D < 200$ mAdc, $T_A = -40^\circ\text{C}$ to $+85^\circ\text{C}$) ($V_{GS} = 5.0$ Vdc, $I_D = 200$ mAdc)	$r_{DS(\text{on})}$	– –	5.6 –	10 3.5	Ω
Forward Transconductance ($V_{DS} = 25$ Vdc, $I_D = 200$ mAdc, $f = 1.0$ kHz)	g_{fs}	100	–	–	mmhos

DYNAMIC CHARACTERISTICS

Input Capacitance	($V_{DS} = 25$ Vdc, $V_{GS} = 0$, $f = 1$ MHz)	C_{iss}	–	40	50	pF
Output Capacitance	($V_{DS} = 25$ Vdc, $V_{GS} = 0$, $f = 1$ MHz)	C_{oss}	–	12	25	
Transfer Capacitance	($V_{DG} = 25$ Vdc, $V_{GS} = 0$, $f = 1$ MHz)	C_{rss}	–	3.5	5.0	

SWITCHING CHARACTERISTICS (Note 2)

Turn-On Delay Time	($V_{DD} = 30$ Vdc, $I_D = 0.2$ Adc,)	$t_{d(\text{on})}$	–	–	20	ns
Turn-Off Delay Time		$t_{d(\text{off})}$	–	–	20	

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.

1. Pulse Test: Pulse Width ≤ 300 μs , Duty Cycle $\leq 2\%$.
2. Switching characteristics are independent of operating junction temperature.
3. ESD between the gate and source serves only, no gate overvoltage rating is implied.

TYPICAL ELECTRICAL CHARACTERISTICS

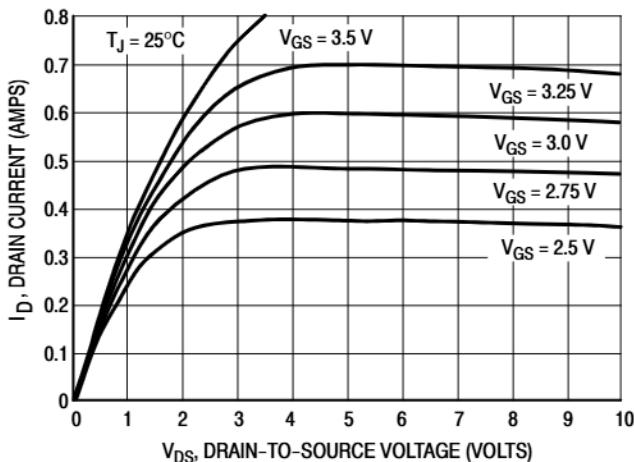


Figure 1. On-Region Characteristics

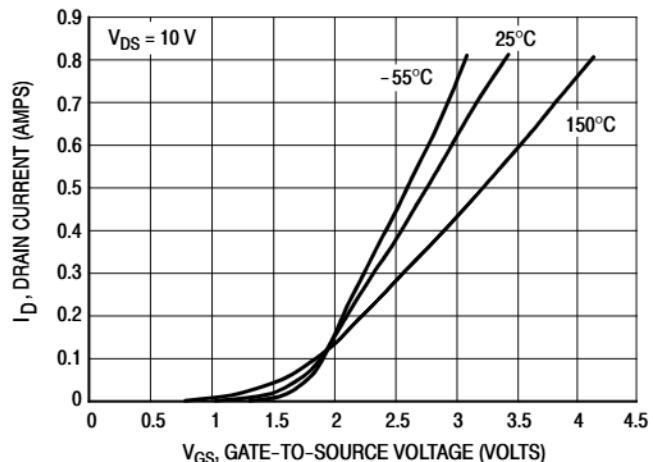


Figure 2. Transfer Characteristics

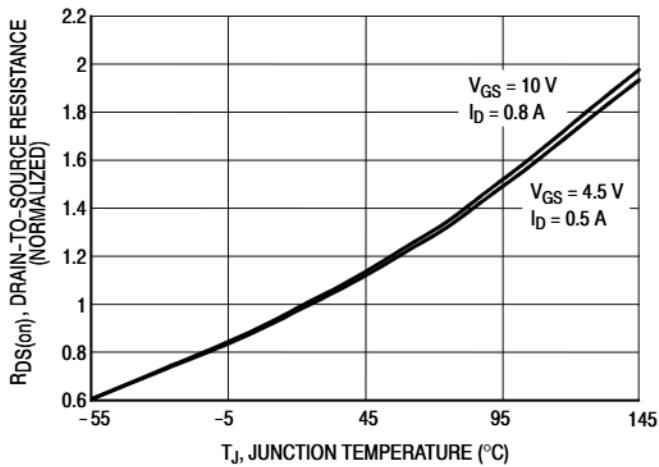


Figure 3. On-Resistance Variation with Temperature

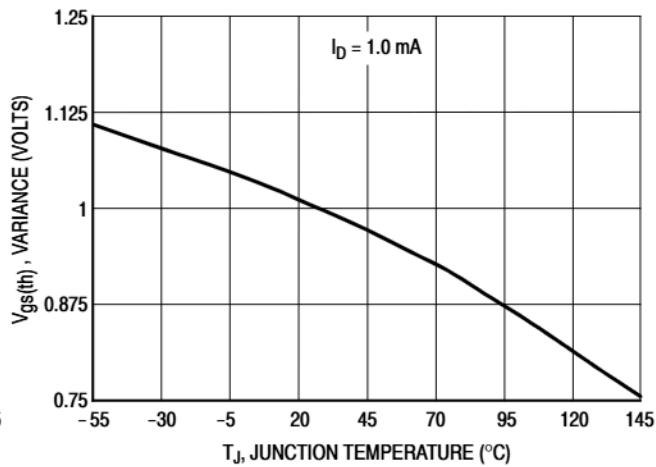


Figure 4. Threshold Voltage Variation with Temperature

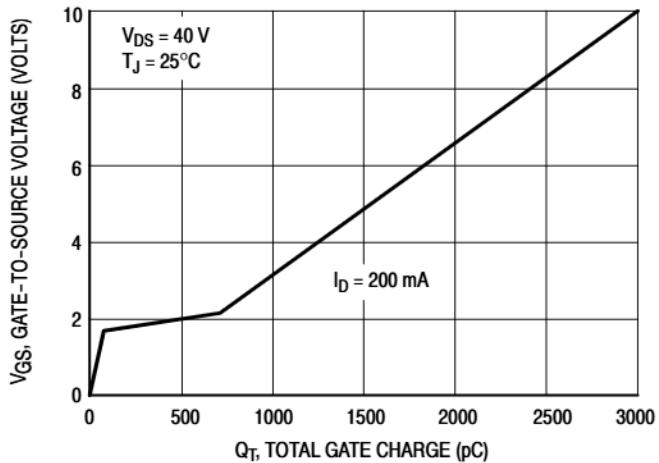


Figure 5. Gate Charge

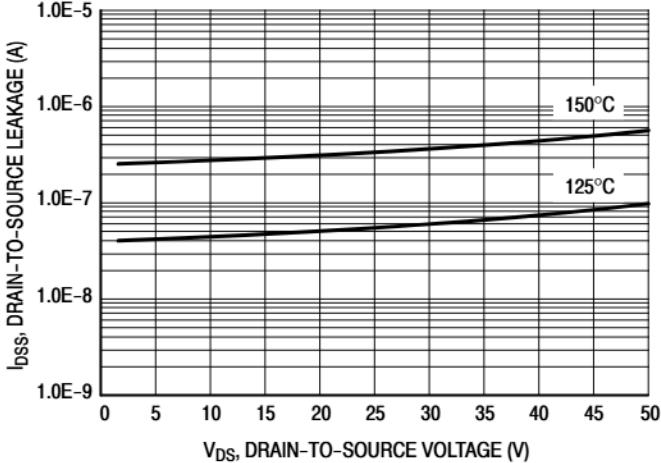


Figure 6. IDSS

BSS138L, BVSS138L

TYPICAL ELECTRICAL CHARACTERISTICS

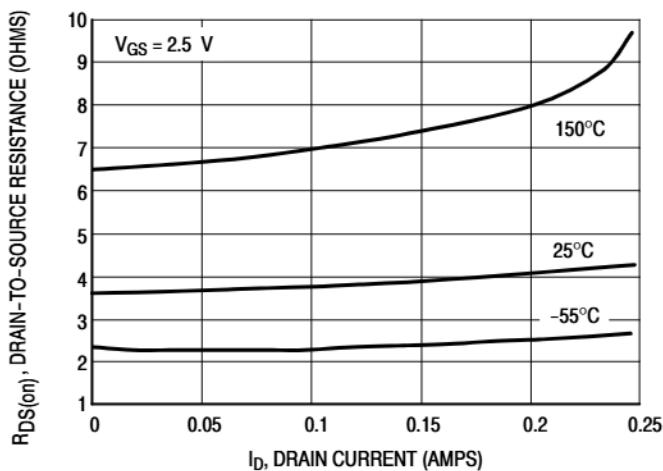


Figure 7. On-Resistance versus Drain Current

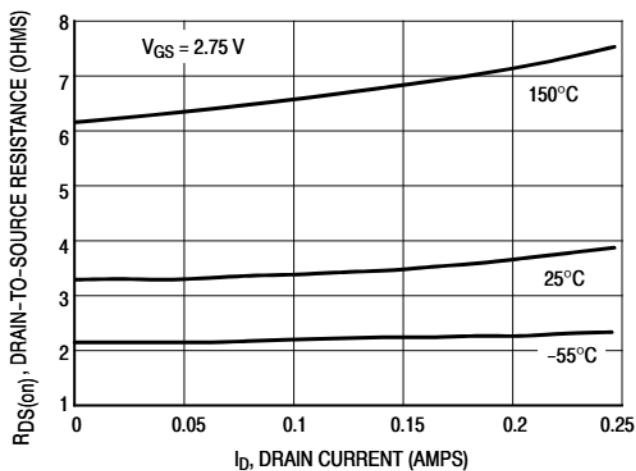


Figure 8. On-Resistance versus Drain Current

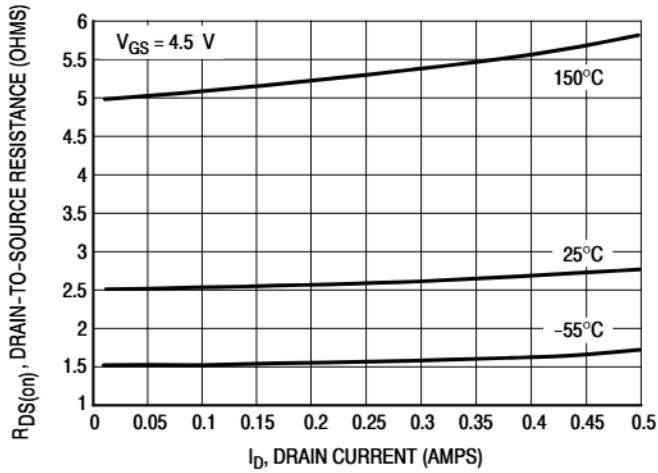


Figure 9. On-Resistance versus Drain Current

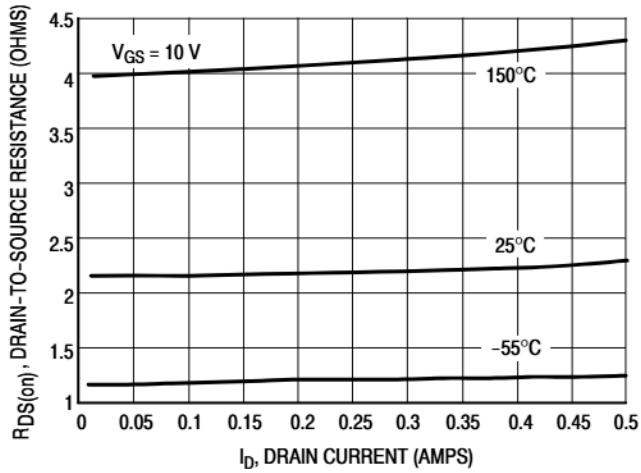


Figure 10. On-Resistance versus Drain Current

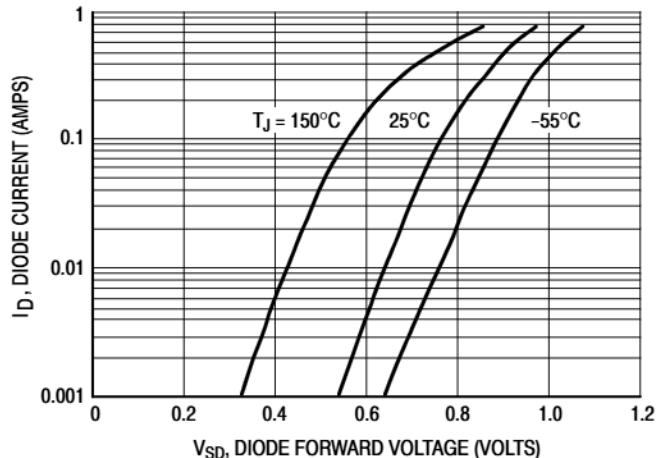


Figure 11. Body Diode Forward Voltage

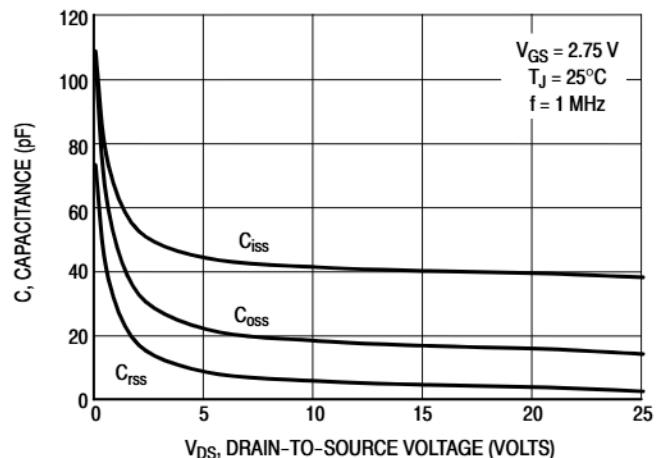


Figure 12. Capacitance

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TYPICAL ELECTRICAL CHARACTERISTICS

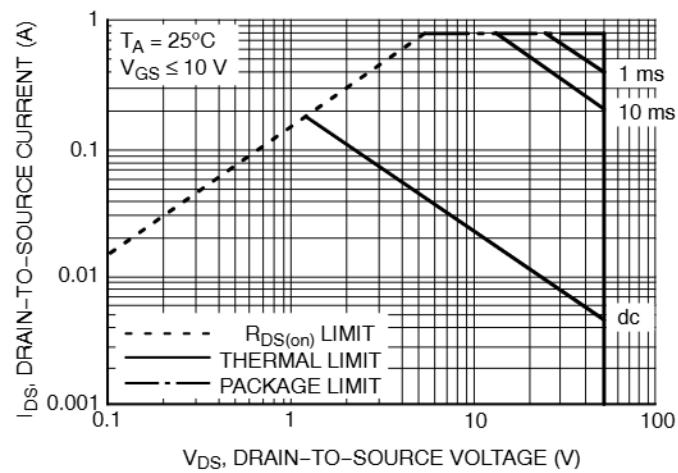


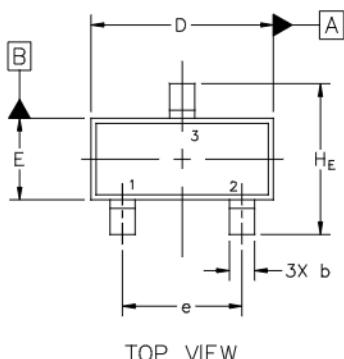
Figure 13. Safe Operating Area



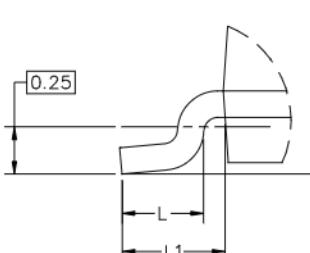
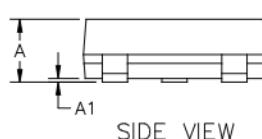
SCALE 4:1

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

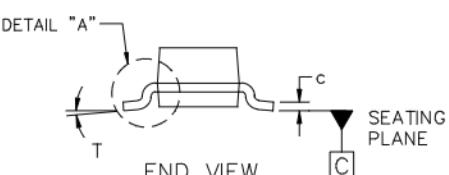
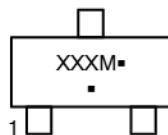
DATE 14 AUG 2024



TOP VIEW

DETAIL "A"
Scale 3:1

SIDE VIEW

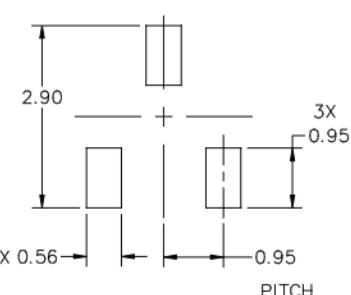
SEATING
PLANE
**GENERIC
MARKING DIAGRAM***


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, SOLDERRM/D.

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
H _E	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.

STYLES ON PAGE 2

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CASE 318

ISSUE AU

DATE 14 AUG 2024

STYLE 1 THRU 5:
CANCELLEDSTYLE 6:
PIN 1. BASE
2. Emitter
3. CollectorSTYLE 7:
PIN 1. Emitter
2. Base
3. CollectorSTYLE 8:
PIN 1. Anode
2. No Connection
3. CathodeSTYLE 9:
PIN 1. Anode
2. Anode
3. CathodeSTYLE 10:
PIN 1. Drain
2. Source
3. GateSTYLE 11:
PIN 1. Anode
2. Cathode
3. Cathode-AnodeSTYLE 12:
PIN 1. Cathode
2. Cathode
3. AnodeSTYLE 13:
PIN 1. Source
2. Drain
3. GateSTYLE 14:
PIN 1. Cathode
2. Gate
3. AnodeSTYLE 15:
PIN 1. Gate
2. Cathode
3. AnodeSTYLE 16:
PIN 1. Anode
2. Cathode
3. CathodeSTYLE 17:
PIN 1. No Connection
2. Anode
3. CathodeSTYLE 18:
PIN 1. No Connection
2. Cathode
3. AnodeSTYLE 19:
PIN 1. Cathode
2. Anode
3. Cathode-AnodeSTYLE 20:
PIN 1. Cathode
2. Anode
3. GateSTYLE 21:
PIN 1. Gate
2. Source
3. DrainSTYLE 22:
PIN 1. Return
2. Output
3. InputSTYLE 23:
PIN 1. Anode
2. Anode
3. CathodeSTYLE 24:
PIN 1. Gate
2. Drain
3. SourceSTYLE 25:
PIN 1. Anode
2. Cathode
3. GateSTYLE 26:
PIN 1. Cathode
2. Anode
3. No ConnectionSTYLE 27:
PIN 1. Cathode
2. Cathode
3. CathodeSTYLE 28:
PIN 1. Anode
2. Anode
3. Anode

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