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INTEGRATED RELAY AND INDUCTIVE LOAD DRIVER

Product Summary

BV_{DSS}	$R_{DS(ON)}$ max	I_D max T_A = +25°C
60V	1.8Ω @ V_{GS} = 5V	630mA
	2.4Ω @ V_{GS} = 3V	

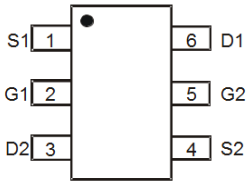
Description and Applications

DMN61D8LVTQ provides a single component solution for switching inductive loads such as relays, solenoids, and small DC motors in automotive applications, without the need of a freewheeling diode. DMN61D8LVTQ accepts logic level inputs, thus allowing it to be driven by logic gates, inverters and microcontrollers. It is ideally suited for door, window and antenna relay coils.

ESD Protected Gate

TSOT26

Top View



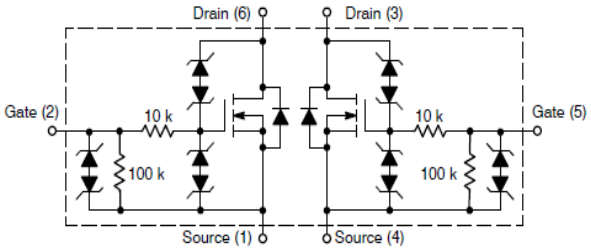
Top View
Internal Schematic

Features and Benefits

- Provides a reliable and robust interface between sensitive logic and DC relay coils
- Replaces 3 to 4 discrete components enabling PCB footprint to be reduced
- Internal active clamp removes the need for external zener diode
- **Totally Lead-Free & Fully RoHS Compliant (Notes 1 & 2)**
- **Halogen and Antimony Free. "Green" Device (Note 3)**
- **Qualified to AEC-Q101 Standards for High Reliability**
- **PPAP Capable (Note 4)**

Mechanical Data

- Case: TSOT26
- Case Material: Molded Plastic, "Green" Molding Compound; UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminals Connections: See Diagram
- Terminals: Finish – Matte Tin Annealed over Copper Leadframe; Solderable per MIL-STD-202, Method 208 e3
- Weight: 0.013 grams (Approximate)



Equivalent Circuit

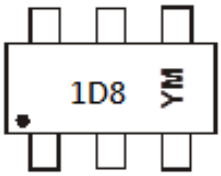
Ordering Information (Note 5)

Part Number	Case	Packaging
DMN61D8LVTQ-7	TSOT26	3,000/Tape & Reel
DMN61D8LVTQ-13	TSOT26	10,000/Tape & Reel

Notes:
1. No purposely added lead. Fully EU Directive 2002/95/EC (RoHS) & 2011/65/EU (RoHS 2) compliant.
2. See http://www.diodes.com/quality/lead_free.html for more information about Diodes Incorporated's definitions of Halogen- and Antimony-free, "Green" and Lead-free.
3. Halogen- and Antimony-free "Green" products are defined as those which contain <900ppm bromine, <900ppm chlorine (<1500ppm total Br + Cl) and <1000ppm antimony compounds.
4. Automotive products are AEC-Q101 qualified and are PPAP capable. Refer to http://www.diodes.com/product_compliance_definitions.html.
5. For packaging details, go to our website at http://www.diodes.com/products/packages.html.

Marking Information

TSOT26



1D8 = Product Type Marking Code
YM = Date Code Marking
Y = Year (ex: D = 2016)
M = Month (ex: 9 = September)

Date Code Key

Year	2016	2017	2018	2019	2020	2021	2022
Code	D	E	F	G	H	I	J

Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Code	1	2	3	4	5	6	7	8	9	O	N	D

Maximum Ratings (@T_A = +25°C, unless otherwise specified.)

Characteristic			Symbol	Value	Units
Drain-Source Voltage			V_{DSS}	60	V
Gate-Source Voltage			V_{GSS}	±12	V
Continuous Drain Current (Note 7)	Steady State	T_A = +25°C T_A = +70°C	I_D	630 500	mA
Maximum Continuous Body Diode Forward Current (Note 7)			I_S	0.5	A
Single Pulse Drain-to-Source Avalanche Energy (For Relay's Coils/Inductive Loads of 80Ω or Higher) (T_J Initial = +85°C)			EZ	200	mJ
Peak Power Dissipation, Drain-to-Source (Non repetitive current square pulse 1.0ms duration) (T_J Initial = +85°C)			PPK	20	W
Load Dump Pulse, Drain-to-Source, R_{SOURCE} = 0.5Ω, t = 300ms) (For Relay's Coils/Inductive Loads of 80Ω or Higher) (T_J Initial = +85°C)			ELD1	60	V
Inductive Switching Transient 1, Drain-to-Source (Waveform: R_{SOURCE} = 10Ω, t = 2.0ms) (For Relay's Coils/Inductive Loads of 80Ω or Higher) (T_J Initial = +85°C)			ELD2	100	V
Inductive Switching Transient 2, Drain-to-Source (Waveform: R_{SOURCE} = 4.0Ω, t = 50µs) (For Relay's Coils/Inductive Loads of 80Ω or Higher) (T_J Initial = +85°C)			ELD3	300	V
Reverse Battery, 10 Minutes (Drain-to-Source) (For Relay's Coils/Inductive Loads of 80Ω or more)			Rev−Bat	-14	V
Dual Voltage Jump Start, 10 Minutes (Drain-to-Source)			Dual−Volt	28	V
ESD Human Body Model (HBM)			ESD	4,000	V

Thermal Characteristics (@T_A = +25°C, unless otherwise specified.)

Characteristic		Symbol	Value	Units
Total Power Dissipation (Note 6)		P_D	820	mW
Thermal Resistance, Junction to Ambient (Note 6)	Steady State	$R_{\theta JA}$	154	°C/W
Total Power Dissipation (Note 7)		P_D	1,090	mW
Thermal Resistance, Junction to Ambient (Note 7)	Steady State	$R_{\theta JA}$	116	°C/W
Operating and Storage Temperature Range		T_J, T_{STG}	-55 to +150	°C

Notes: 6. Device mounted on FR-4 PCB, with minimum recommended pad layout.
7. Device mounted on 1" x 1" FR-4 PCB with high coverage 2oz. copper, single sided.

Electrical Characteristics (@T_A = +25°C, unless otherwise specified.)

Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
OFF CHARACTERISTICS (Note 8)						
Drain-Source Breakdown Voltage	BV_{DSS}	60	—	—	V	V_{GS} = 0V, I_D = 10mA
Zero Gate Voltage Drain Current	I_{DSS}	—	—	50 0.5	μA	V_{DS} = 60V, V_{GS} = 0V V_{DS} = 12V, V_{GS} = 0V
Gate-Source Leakage	I_{GSS}	—	—	±90 ±60	μA	V_{GS} = ±5V, V_{DS} = 0V V_{GS} = ±3V, V_{DS} = 0V
ON CHARACTERISTICS (Note 8)						
Gate Threshold Voltage	$V_{GS(TH)}$	1.3	—	2.0	V	V_{DS} = V_{GS}, I_D = 1mA
Static Drain-Source On-Resistance	$R_{DS(ON)}$	—	1.1 1.4	1.8 2.4	Ω	V_{GS} = 5V, I_D = 0.15A V_{GS} = 3V, I_D = 0.15A
Forward Transfer Admittance	$\|Y_{fs}\|$	80	—	—	ms	V_{DS} = 12V, I_D = 0.15A
Diode Forward Voltage	V_{SD}	—	—	1.2	V	V_{GS} = 0V, I_S = 0.15A
DYNAMIC CHARACTERISTICS (Note 9)						
Input Capacitance	C_{iss}	—	12.9	—	pF	V_{DS} = 12V, V_{GS} = 0V f = 1.0MHz
Output Capacitance	C_{oss}	—	17	—	pF	
Reverse Transfer Capacitance	C_{rss}	—	0.84	—	pF	
Total Gate Charge	Q_g	—	0.74	—	nC	V_{GS} = 5V, V_{DS} = 12V, I_D =150mA
Gate-Source Charge	Q_{gs}	—	0.19	—	nC	
Gate-Drain Charge	Q_{gd}	—	0.16	—	nC	
Turn-On Delay Time	$t_{D(ON)}$	—	131	—	ns	V_{DD} = 12V, V_{GS} = 5V
Turn-On Rise Time	t_R	—	301	—	ns	
Turn-Off Delay Time	$t_{D(OFF)}$	—	582	—	ns	
Turn-Off Fall Time	t_F	—	440	—	ns	

Notes: 8. Short duration pulse test used to minimize self-heating effect.
9. Guaranteed by design. Not subject to product testing.

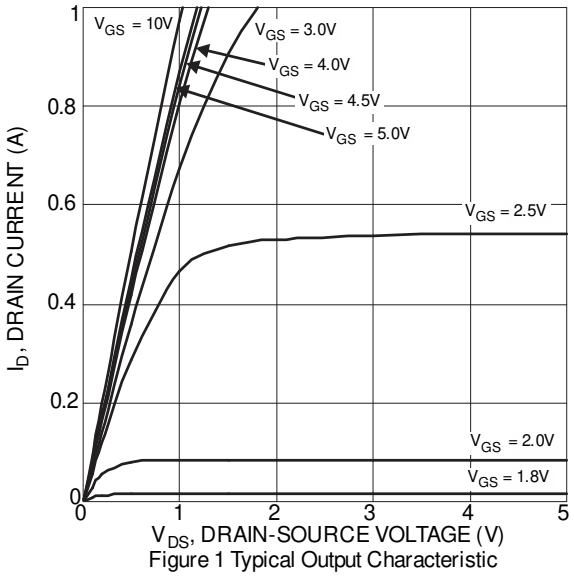


Figure 1 Typical Output Characteristic

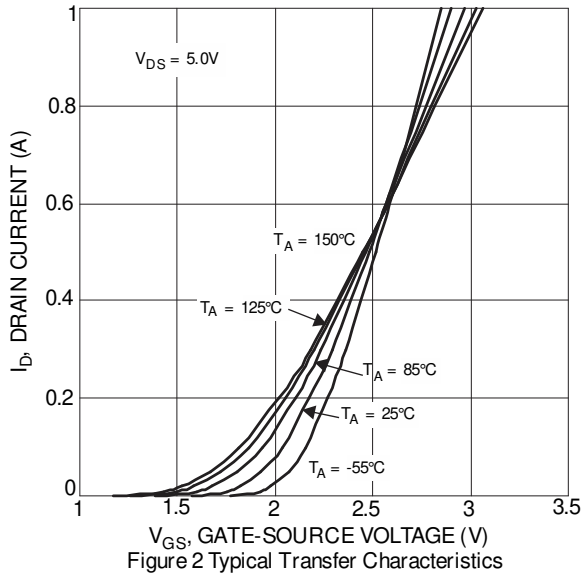


Figure 2 Typical Transfer Characteristics

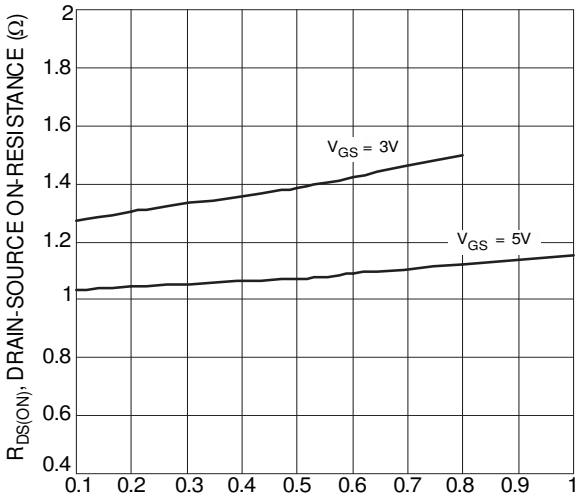


Figure 3 Typical On-Resistance vs. Drain Current and Gate Voltage

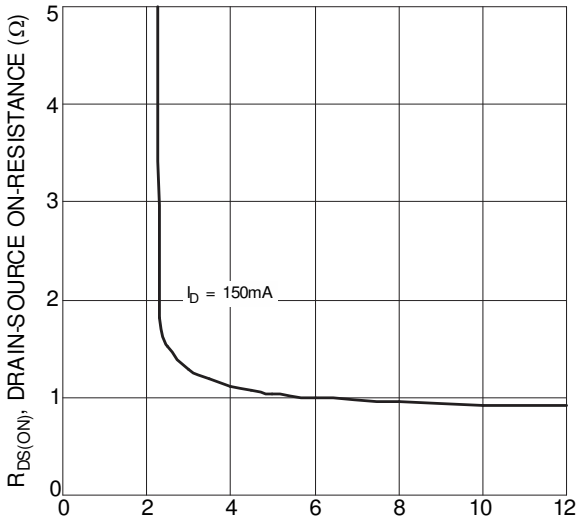


Figure 4 Typical Transfer Characteristic

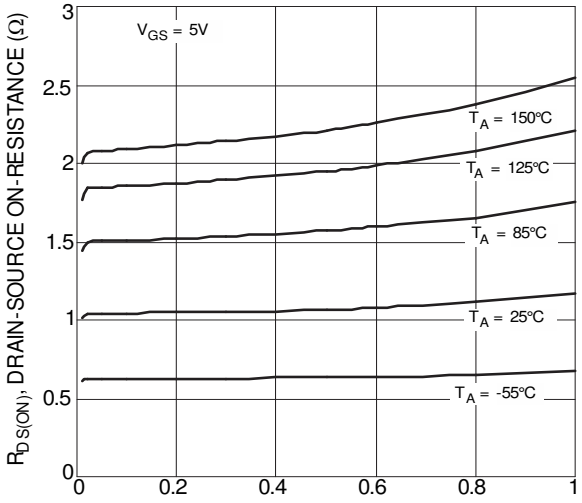


Figure 5 Typical On-Resistance vs. Drain Current and Temperature

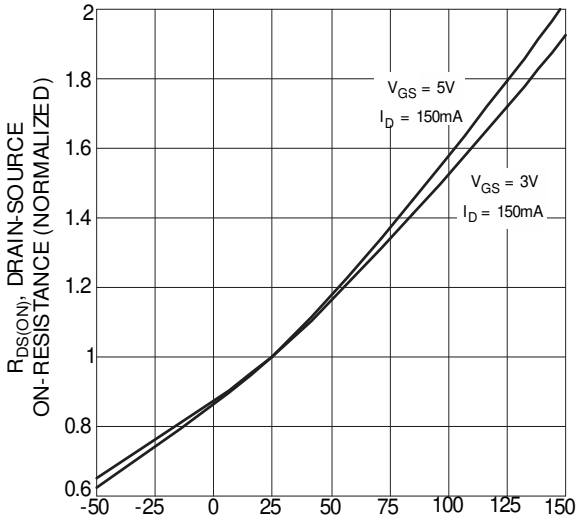


Figure 6 On-Resistance Variation with Temperature

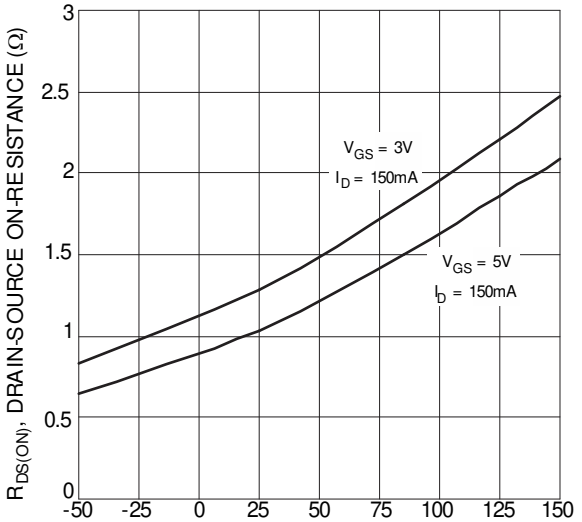


Figure 7 On-Resistance Variation with Temperature

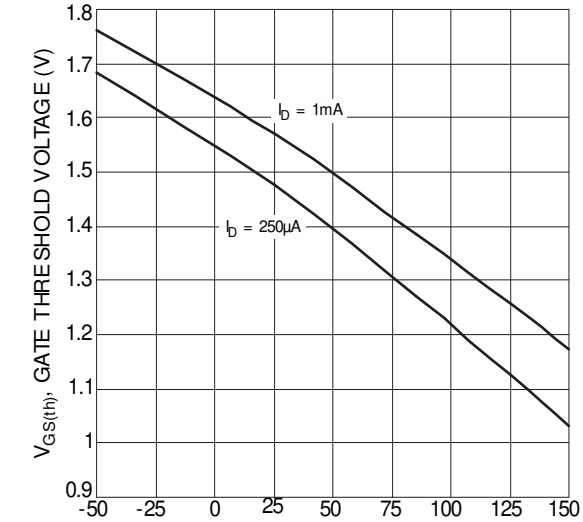


Figure 8 Gate Threshold Variation vs. Junction Temperature

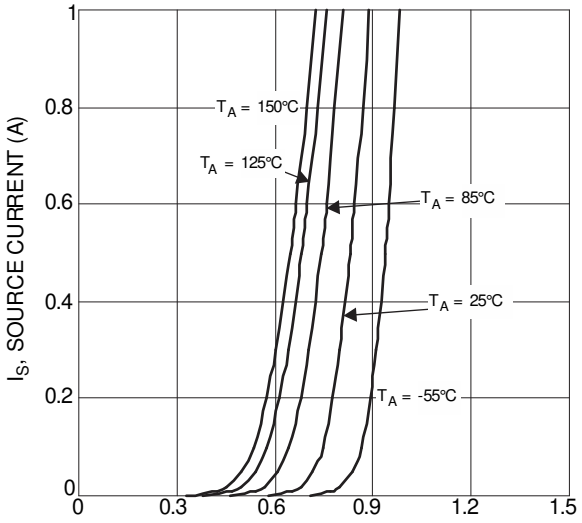


Figure 9 Diode Forward Voltage vs. Current

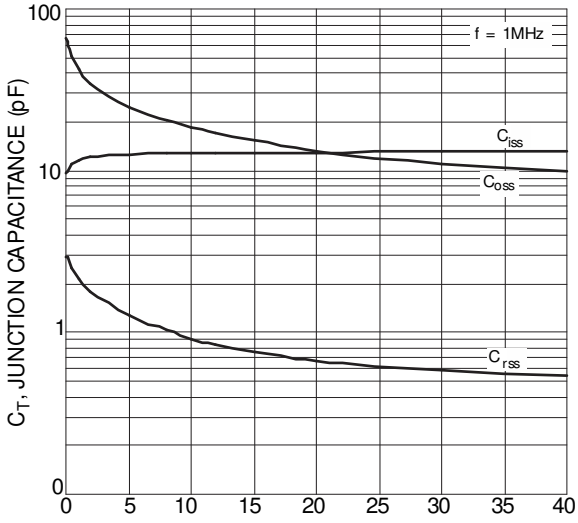


Figure 10 Typical Junction Capacitance

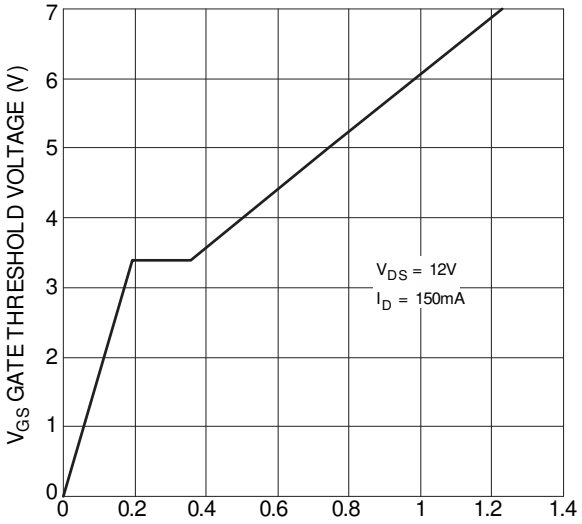


Figure 11 Gate Charge

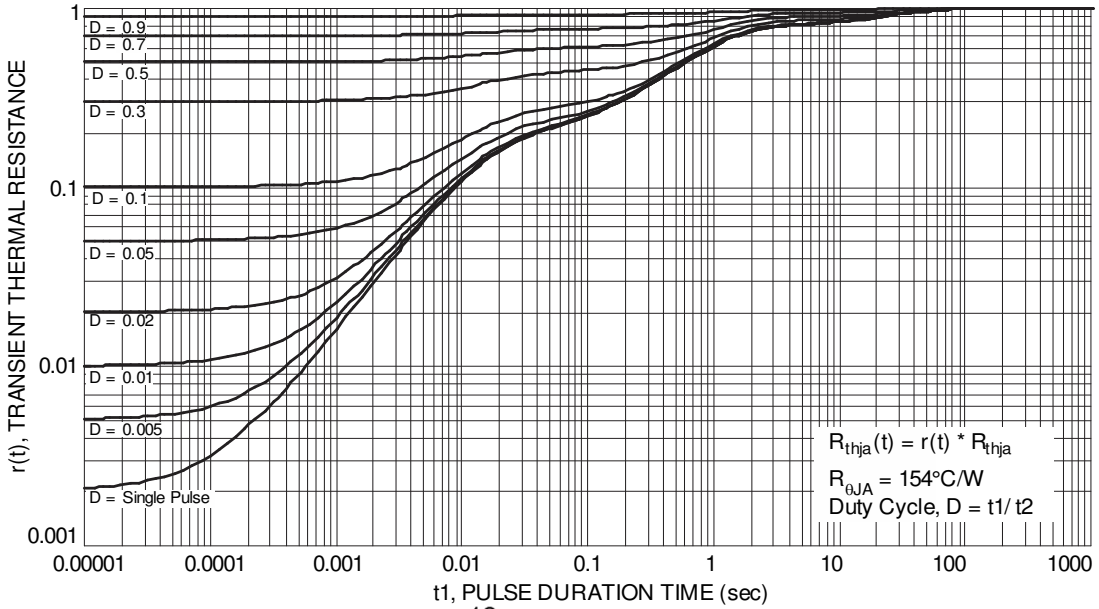
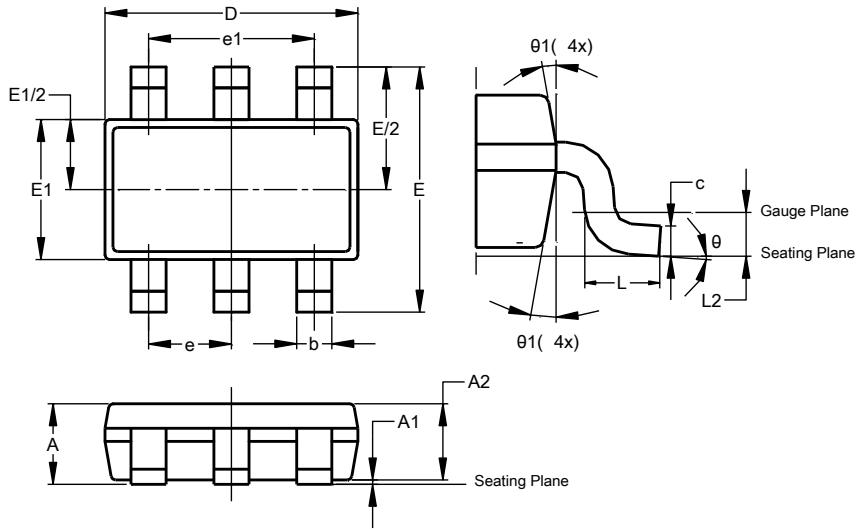


Figure 12 Transient Thermal Resistance

Package Outline Dimensions

Please see http://www.diodes.com/package-outlines.html for the latest version.

TSOT26

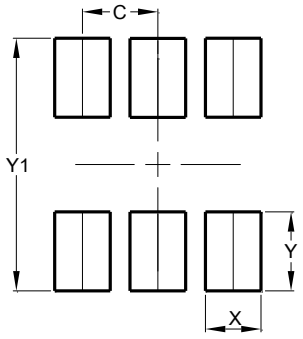


TSOT26			
Dim	**Min**	**Max**	**Typ**
A	–	1.00	–
A1	0.010	0.100	–
A2	0.840	0.900	–
D	2.800	3.000	2.900
E	2.800 BSC		
E1	1.500	1.700	1.600
b	0.300	0.450	–
c	0.120	0.200	–
e	0.950 BSC		
e1	1.900 BSC		
L	0.30	0.50	–
L2	0.250 BSC		
θ	0°	8°	4°
θ1	4°	12°	–
All Dimensions in mm			

Suggested Pad Layout

Please see http://www.diodes.com/package-outlines.html for the latest version.

TSOT26



Dimensions	Value (in mm)
C	0.950
X	0.700
Y	1.000
Y1	3.199

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