

Product Summary

BV _{DSS}	R _{DS(ON)} Max	I _D Max T _C = +25°C
20V	24mΩ @ V _{GS} = 4.5V	6.2A
	28mΩ @ V _{GS} = 2.5V	5.7A

Description and Applications

This MOSFET is designed to minimize the on-state resistance (R_{DS(ON)}) yet maintain superior switching performance, making it ideal for high-efficiency power management applications.

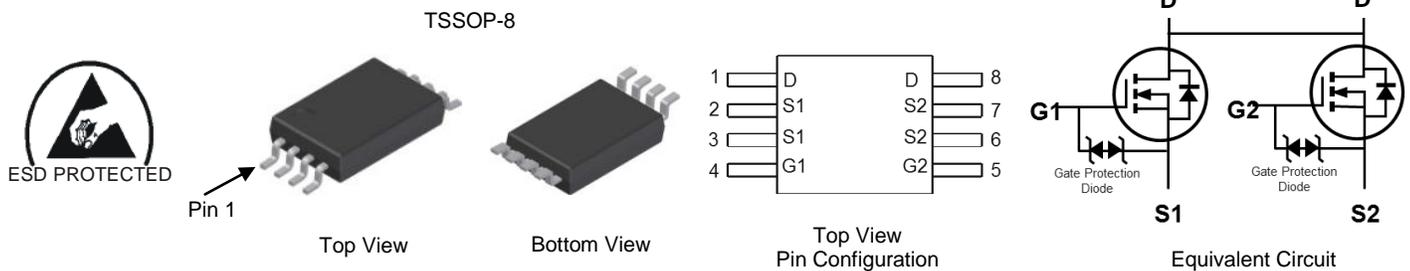
- Battery Management Application
- Power Management Functions
- DC-DC Converters

Features and Benefits

- Low Gate Threshold Voltage
- Low On-Resistance
- **ESD Protected Gate**
- **Totally Lead-Free & Fully RoHS Compliant (Notes 1 & 2)**
- **Halogen and Antimony Free. "Green" Device (Note 3)**

Mechanical Data

- Case: TSSOP-8
- Case Material: Molded Plastic, "Green" Molding Compound.
UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 3 per J-STD-020
- Terminals: Finish—Matte Tin Annealed over Copper Leadframe.
Solderable per MIL-STD-202, Method 208 ^(e3)
- Weight: 0.039 grams (Approximate)

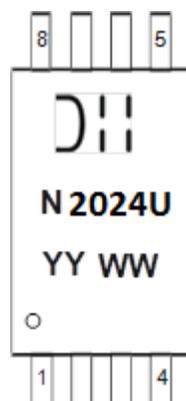


Ordering Information (Note 4)

Part Number	Case	Packaging
DMN2024UTS-13	TSSOP-8	2500/Tape & Reel

- Notes:
1. No purposely added lead. Fully EU Directive 2002/95/EC (RoHS), 2011/65/EU (RoHS 2) & 2015/863/EU (RoHS 3) compliant.
 2. See <https://www.diodes.com/quality/lead-free/> 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. For packaging details, go to our website at <https://www.diodes.com/design/support/packaging/diodes-packaging/>.

Marking Information



☐☐☐ = Manufacturer's Marking
 N2024U = Product Type Marking Code
 YYWW = Date Code Marking
 YY = Year (ex: 18 = 2018)
 WW = Week (01 to 53)

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

Characteristic			Symbol	Value	Unit
Drain-Source Voltage			V _{DSS}	20	V
Gate-Source Voltage			V _{GSS}	±10	V
Continuous Drain Current (Note 6) V _{GS} = 4.5V	Steady State	T _A = +25°C T _A = +70°C	I _D	6.2 4.9	A
	Steady State	T _C = +25°C T _C = +70°C	I _D	15.2 12.1	A
Pulsed Drain Current (10µs Pulse, Duty Cycle = 1%)			I _{DM}	45	A
Maximum Continuous Body Diode Forward Current (Note 6)			I _S	1.6	A
Pulsed Source-Drain Diode Current (10µs Pulse, Duty Cycle = 1%)			I _{SM}	45	A
Avalanche Current (Note 7) L = 0.1mH			I _{AS}	12	A
Avalanche Energy (Note 7) L = 0.1mH			E _{AS}	8	mJ

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

Characteristic		Symbol	Value	Unit
Total Power Dissipation (Note 5)	T _A = +25°C	P _D	0.89	W
Thermal Resistance, Junction to Ambient (Note 5)	Steady State	R _{θJA}	140	°C/W
Total Power Dissipation (Note 6)	T _A = +25°C	P _D	1.39	W
Thermal Resistance, Junction to Ambient (Note 6)	Steady State	R _{θJA}	90	°C/W
Thermal Resistance, Junction to Case (Note 6)	Steady State	R _{θJC}	15	
Operating and Storage Temperature Range		T _J , T _{STG}	-55 to +150	°C

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}	20	—	—	V	V _{GS} = 0V, I _D = 250µA
Zero Gate Voltage Drain Current T _J = +25°C	I _{DSS}	—	—	1	µA	V _{DS} = 20V, V _{GS} = 0V
Gate-Source Leakage	I _{GSS}	—	—	±10	µA	V _{GS} = ±8V, V _{DS} = 0V
ON CHARACTERISTICS (Note 8)						
Gate Threshold Voltage	V _{GS(TH)}	0.35	—	0.95	V	V _{DS} = V _{GS} , I _D = 250µA
Static Drain-Source On-Resistance	R _{DSON}	—	16	24	mΩ	V _{GS} = 4.5V, I _D = 6.5A
			18	28		V _{GS} = 2.5V, I _D = 5.5A
Diode Forward Voltage	V _{SD}	—	0.7	1.0	V	V _{GS} = 0V, I _S = 1A
DYNAMIC CHARACTERISTICS (Note 9)						
Input Capacitance	C _{iss}	—	647	—	pF	V _{DS} = 10V, V _{GS} = 0V, f = 1.0MHz
Output Capacitance	C _{oss}	—	78	—	pF	
Reverse Transfer Capacitance	C _{rss}	—	38	—	pF	
Gate Resistance	R _G	—	628	—	Ω	V _{DS} = 0V, V _{GS} = 0V, f = 1MHz
Total Gate Charge (V _{GS} = 4.5V)	Q _G	—	7.1	—	nC	V _{DS} = 10V, I _D = 6.5A
Total Gate Charge (V _{GS} = 10V)	Q _G	—	0.9	—	nC	
Gate-Source Charge	Q _{GS}	—	0.7	—	nC	
Gate-Drain Charge	Q _{GD}	—	98	—	nC	
Turn-On Delay Time	t _{D(ON)}	—	140	—	ns	V _{DS} = 10V, V _{GS} = 4.5V, R _G = 6Ω, R _L = 10Ω, I _D = 1A
Turn-On Rise Time	t _R	—	1024	—	ns	
Turn-Off Delay Time	t _{D(OFF)}	—	434	—	ns	
Turn-Off Fall Time	t _F	—	245	—	ns	
Reverse Recovery Time	t _{RR}	—	149	—	ns	I _F = 1A, di/dt = 100A/µs
Reverse Recovery Charge	Q _{RR}	—	647	—	nC	

- Notes:
5. Device mounted on FR-4 substrate PC board, 2oz copper, with minimum recommended pad layout.
 6. Device mounted on FR-4 substrate PC board, 2oz copper, with 1inch square copper plate.
 7. I_{AS} and E_{AS} ratings are based on low frequency and duty cycles to keep T_J = +25°C.
 8. Short duration pulse test used to minimize self-heating effect.
 9. Guaranteed by design. Not subject to product testing.

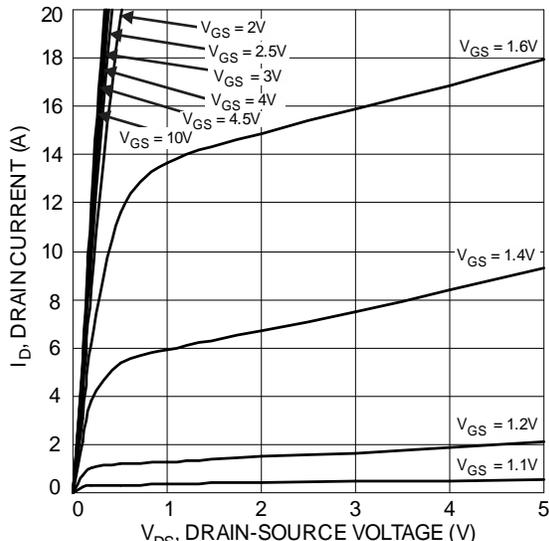


Figure 1 Typical Output Characteristic

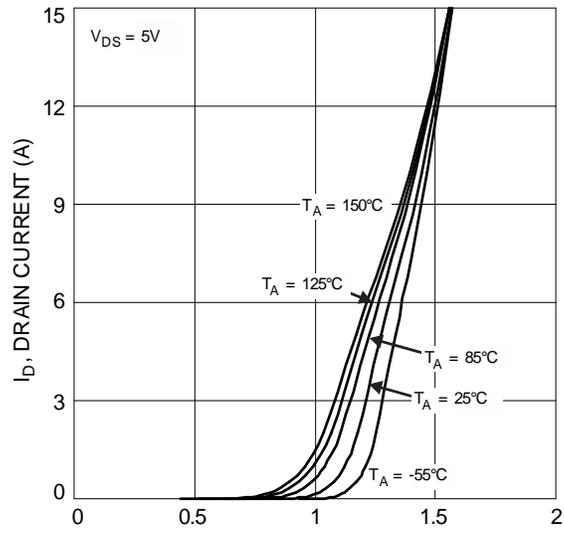


Figure 2 Typical Transfer Characteristics

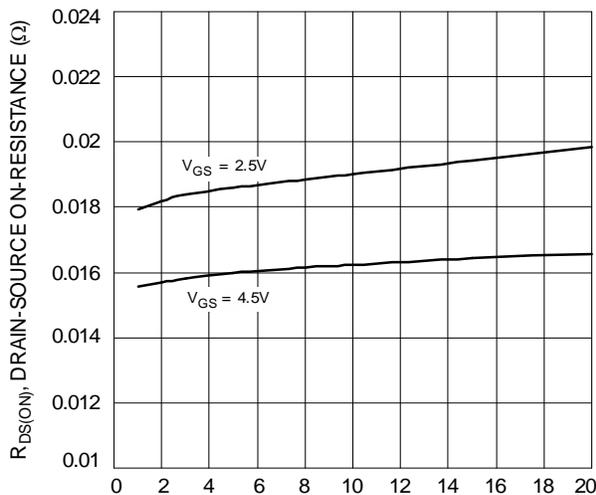


Figure 3 Typical On-Resistance vs. Drain Current and Gate Voltage

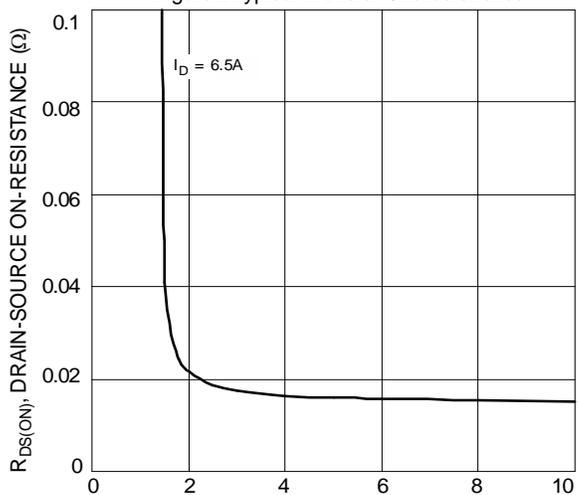


Figure 4 Typical Drain-Source On-Resistance vs. Gate-Source Voltage

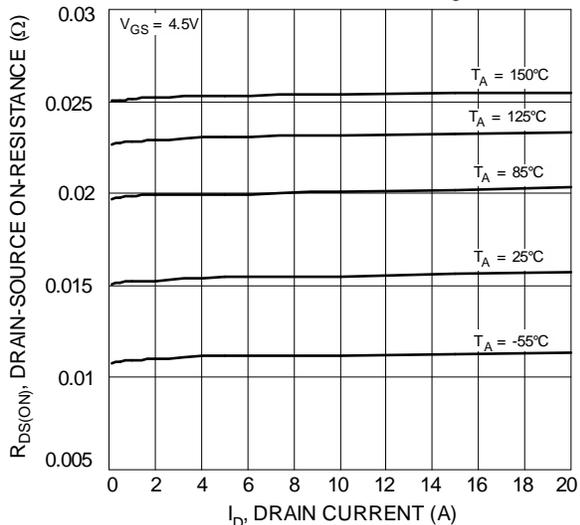


Figure 5 Typical On-Resistance vs. Drain Current and Temperature

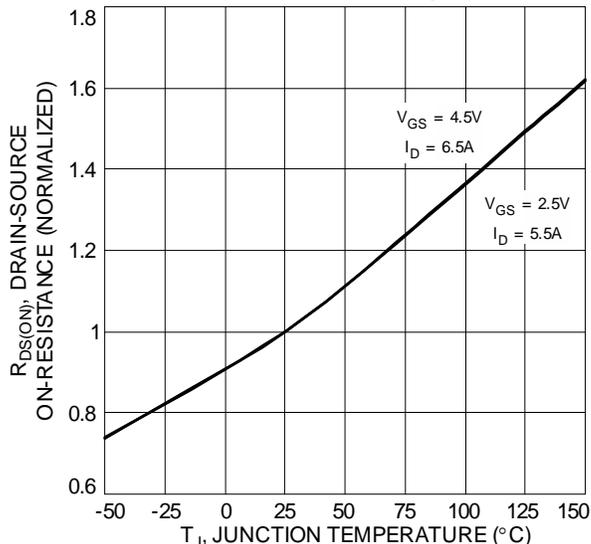


Figure 6 On-Resistance Variation with Temperature

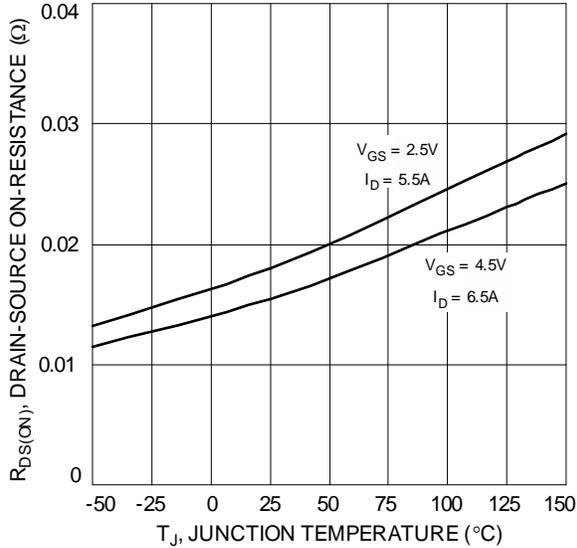


Figure 7 On-Resistance Variation with Temperature

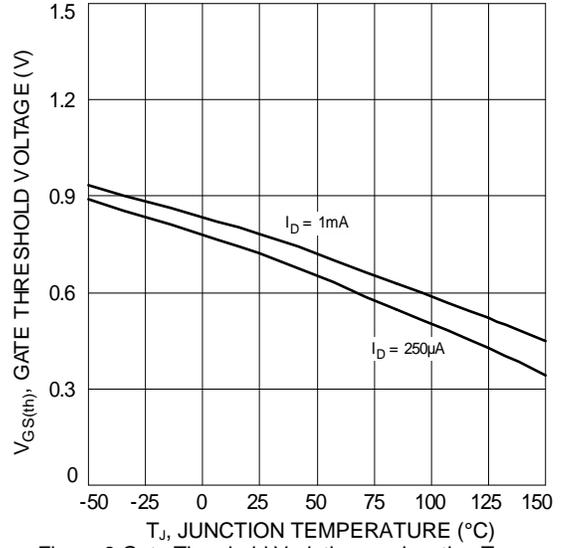


Figure 8 Gate Threshold Variation vs. Junction Temperature

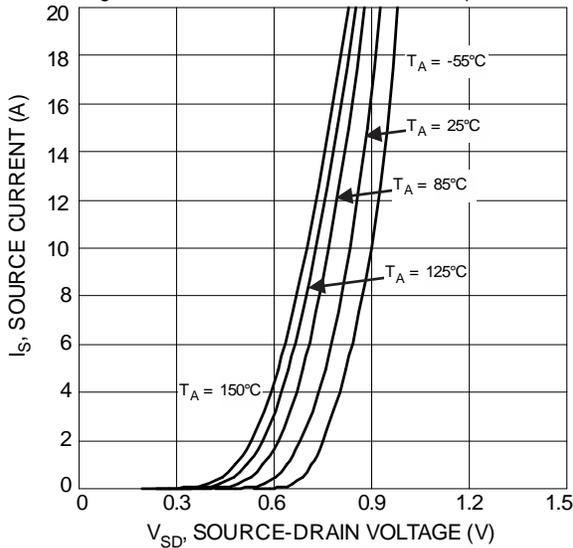


Figure 9 Diode Forward Voltage vs. Current

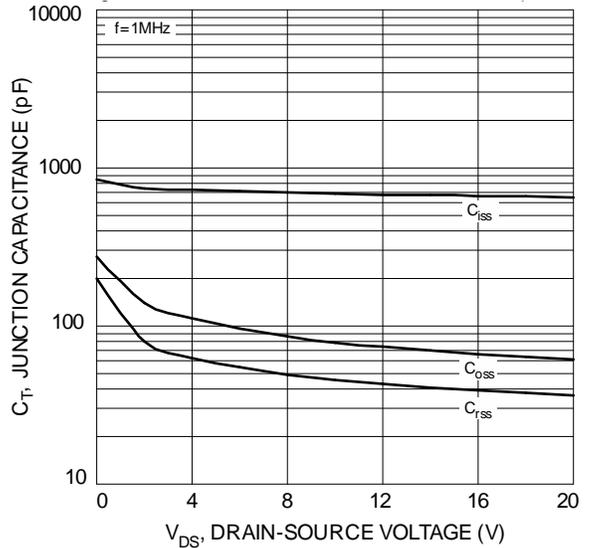


Figure 10 Typical Junction Capacitance

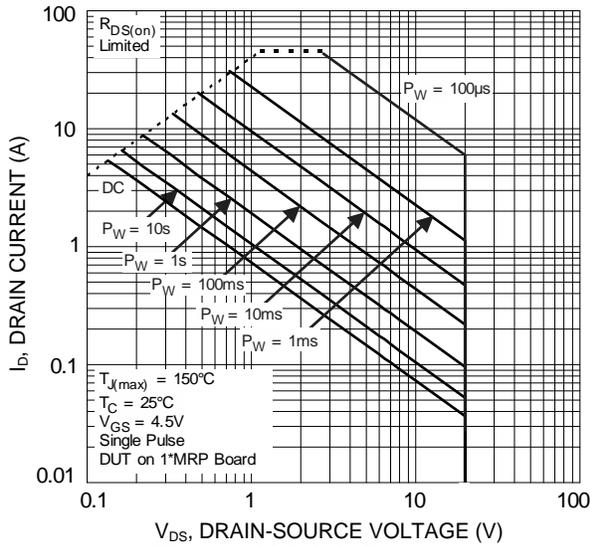


Figure 11 SOA, Safe Operation Area

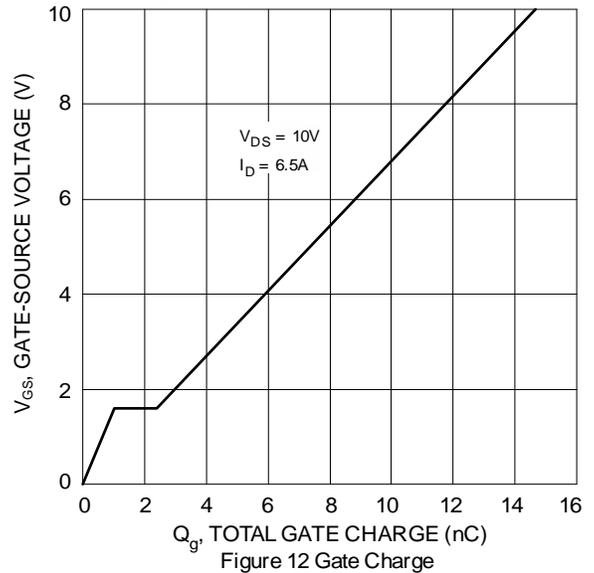
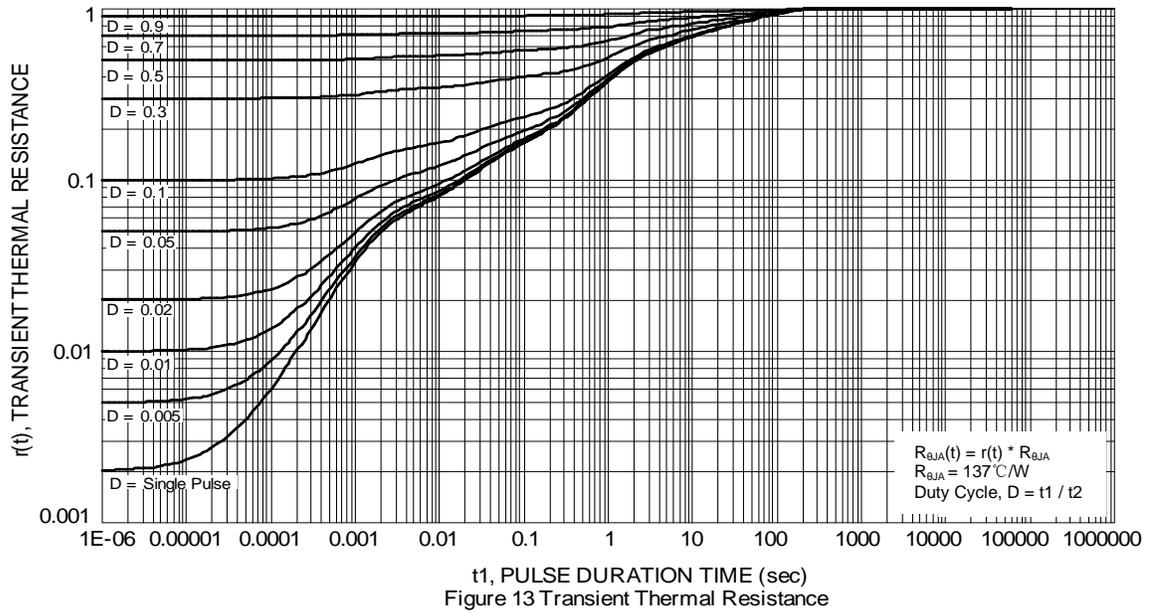


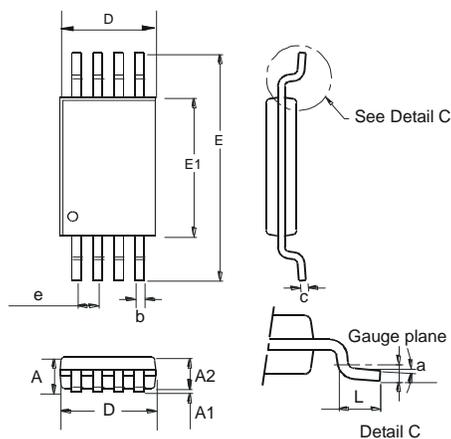
Figure 12 Gate Charge



Package Outline Dimensions

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

TSSOP-8

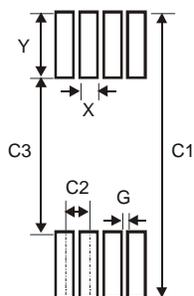


TSSOP-8			
Dim	Min	Max	Typ
a	0.09	–	–
A	–	1.20	–
A1	0.05	0.15	–
A2	0.825	1.025	0.925
b	0.19	0.30	–
c	0.09	0.20	–
D	2.90	3.10	3.025
e	–	–	0.65
E	–	–	6.40
E1	4.30	4.50	4.425
L	0.45	0.75	0.60
All Dimensions in mm			

Suggested Pad Layout

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

TSSOP-8



Dimensions	Value (in mm)
X	0.45
Y	1.78
C1	7.72
C2	0.65
C3	4.16
G	0.20

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