

DUAL N-CHANNEL ENHANCEMENT MODE MOSFET
Product Summary

BV_{DSS}	$R_{DS(ON) \max}$	I_D $T_A = +25^\circ\text{C}$
20V	0.55Ω @ $V_{GS} = 4.5\text{V}$	540mA

Features

- Dual N-Channel MOSFET
- Low On-Resistance
- Low Gate Threshold Voltage
- Low Input Capacitance
- Fast Switching Speed
- Low Input/Output Leakage
- Ultra-Small Surface Mount Package
- **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**
- **An Automotive-Compliant Part is Available Under Separate Datasheet ([DMN2004DWKQ](#))**

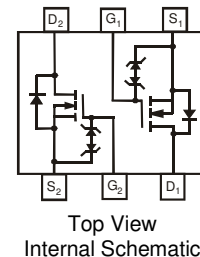
Description and Applications

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

- Load Switch

Mechanical Data

- Case: SOT363
- Case Material: Molded Plastic, "Green" Molding Compound. UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminal Connections: See Diagram
- Terminals: Finish - Matte Tin Annealed over Alloy 42 Lead-Frame. Solderable per MIL-STD-202, Method 208 ^{Ⓔ3}
- Weight: 0.006 grams (Approximate)


Ordering Information (Note 4)

Part Number	Case	Packaging
DMN2004DWK-7	SOT363	3,000/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


NAB = Product Type Marking Code
 YM = Date Code Marking
 Y or Y = Year (ex: H = 2020)
 M = Month (ex: 9 = September)

Date Code Key

Year	2006	2007	2020	2021	2022	2023	2024	2025	2026	2027	2028
Code	T	U	H	I	J	K	L	M	N	O	P

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 (@ $T_A = +25^\circ\text{C}$, unless otherwise specified.)

Characteristic			Symbol	Value	Unit
Drain-Source Voltage			V_{DSS}	20	V
Gate-Source Voltage			V_{GSS}	± 8	V
Drain Current (Note 5)	Steady State	$T_A = +25^\circ\text{C}$	I_D	540	mA
		$T_A = +85^\circ\text{C}$		390	
Pulsed Drain Current (Note 6)			I_{DM}	1.5	A

Thermal Characteristics (@ $T_A = +25^\circ\text{C}$, unless otherwise specified.)

Characteristic	Symbol	Value	Unit
Total Power Dissipation (Note 5)	P_D	200	mW
Thermal Resistance, Junction to Ambient	$R_{\theta JA}$	625	$^\circ\text{C}/\text{W}$
Operating and Storage Temperature Range	T_J, T_{STG}	-55 to +150	$^\circ\text{C}$

Electrical Characteristics (@ $T_A = +25^\circ\text{C}$, unless otherwise specified.)

Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
OFF CHARACTERISTICS (Note 7)						
Drain-Source Breakdown Voltage	BV_{DSS}	20	—	—	V	$V_{GS} = 0\text{V}, I_D = 10\mu\text{A}$
Zero Gate Voltage Drain Current	I_{DSS}	—	—	1	μA	$V_{DS} = 16\text{V}, V_{GS} = 0\text{V}$
Gate-Source Leakage	I_{GSS}	—	—	± 1	μA	$V_{GS} = \pm 4.5\text{V}, V_{DS} = 0\text{V}$
ON CHARACTERISTICS (Note 7)						
Gate Threshold Voltage	$V_{GS(TH)}$	0.5	—	1.0	V	$V_{DS} = V_{GS}, I_D = 250\mu\text{A}$
Static Drain-Source On-Resistance	$R_{DS(ON)}$	—	0.4	0.55	Ω	$V_{GS} = 4.5\text{V}, I_D = 540\text{mA}$
			0.5	0.70		$V_{GS} = 2.5\text{V}, I_D = 500\text{mA}$
			0.7	0.9		$V_{GS} = 1.8\text{V}, I_D = 350\text{mA}$
Forward Transfer Admittance	$ Y_{fs} $	200	—	—	mS	$V_{DS} = 10\text{V}, I_D = 0.2\text{A}$
Diode Forward Voltage (Note 7)	V_{SD}	0.5	—	1.4	V	$V_{GS} = 0\text{V}, I_S = 115\text{mA}$
DYNAMIC CHARACTERISTICS (Note 7)						
Input Capacitance	C_{iss}	—	36	150	pF	$V_{DS} = 16\text{V}, V_{GS} = 0\text{V}$ $f = 1.0\text{MHz}$
Output Capacitance	C_{oss}	—	5.7	25	pF	
Reverse Transfer Capacitance	C_{rss}	—	4.2	20	pF	
Total Gate Charge ($V_{GS} = 4.5\text{V}$)	Q_g	—	0.53	—	nC	$V_{DS} = 10\text{V}, I_D = 250\text{mA}$
Total Gate Charge ($V_{GS} = 8.0\text{V}$)	Q_g	—	0.95	—		
Gate-Source Charge	Q_{gs}	—	0.08	—		
Gate-Drain Charge	Q_{gd}	—	0.07	—		
Turn-On Delay Time	$t_{D(ON)}$	—	4.1	—	ns	$V_{DD} = 10\text{V}, R_L = 47\Omega,$ $V_{GEN} = 4.5\text{V}, R_{GEN} = 10\Omega$
Turn-On Rise Time	t_R	—	7.3	—	ns	
Turn-Off Delay Time	$t_{D(OFF)}$	—	13.8	—	ns	
Turn-Off Fall Time	t_F	—	10.5	—	ns	

- Notes:
- Device mounted on FR-4 PCB.
 - Pulse width $\leq 10\mu\text{s}$, Duty Cycle $\leq 1\%$.
 - Short duration pulse test used to minimize self-heating effect.

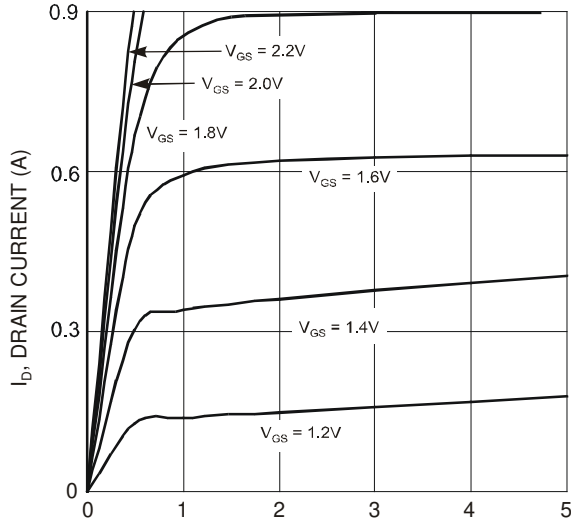


Fig. 1 Typical Output Characteristics

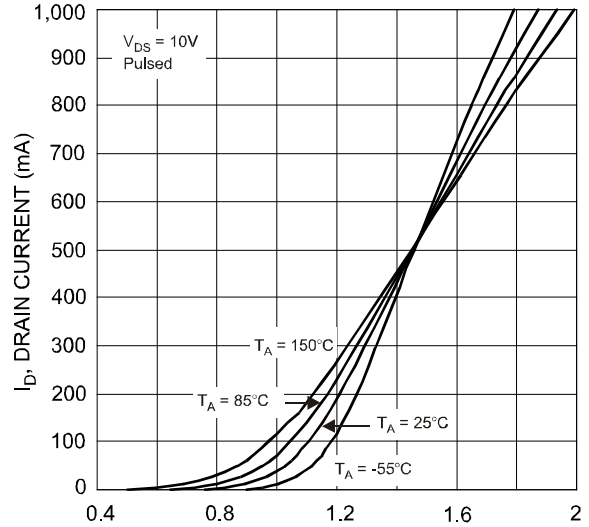


Fig. 2 Typical Transfer Characteristic

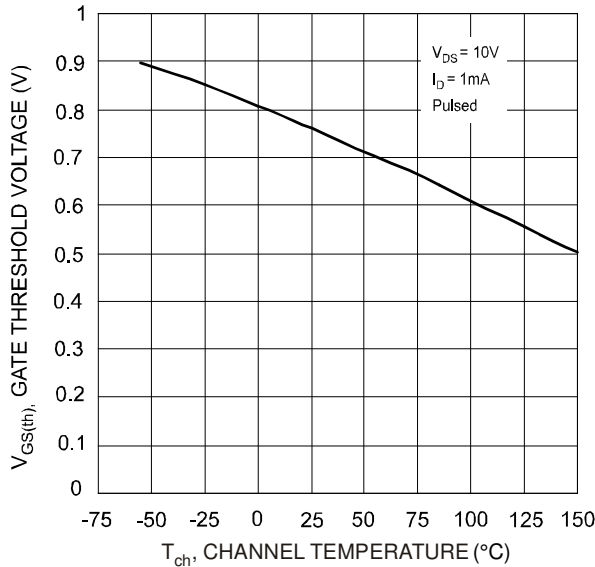


Fig. 3 Gate Threshold Voltage vs. Channel Temperature

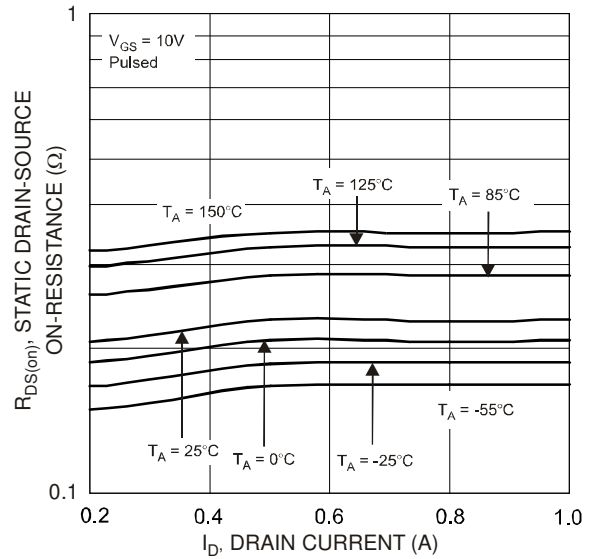


Fig. 4 Static Drain-Source On-Resistance Vs. Drain Current

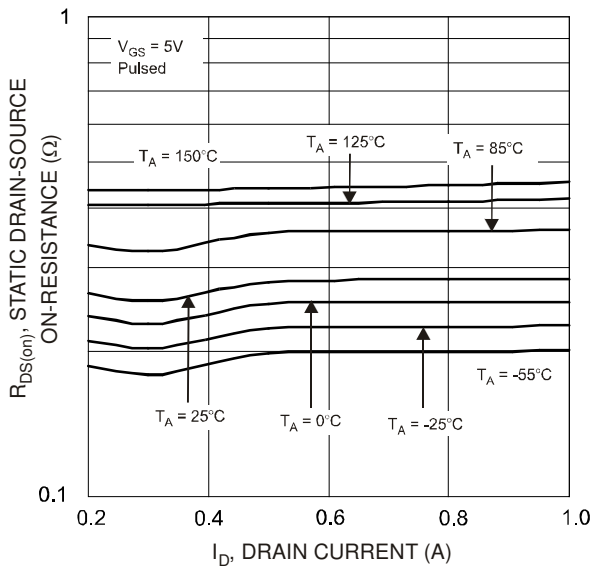


Fig. 5 Static Drain-Source On-Resistance vs. Drain Current

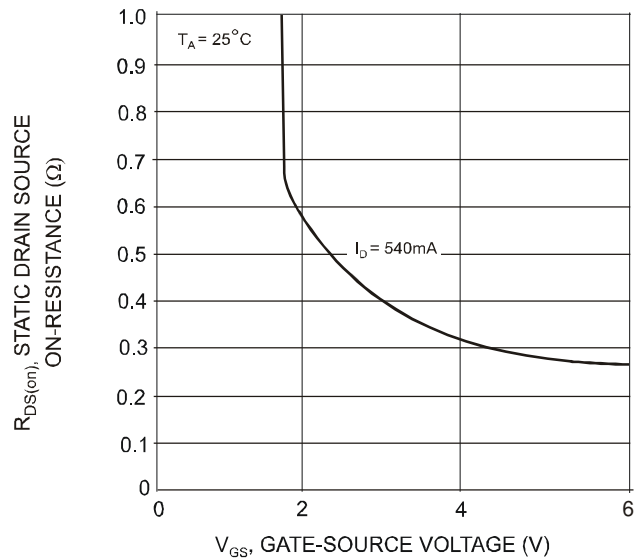


Fig. 6 Static Drain-Source, On-Resistance vs. Gate-Source Voltage

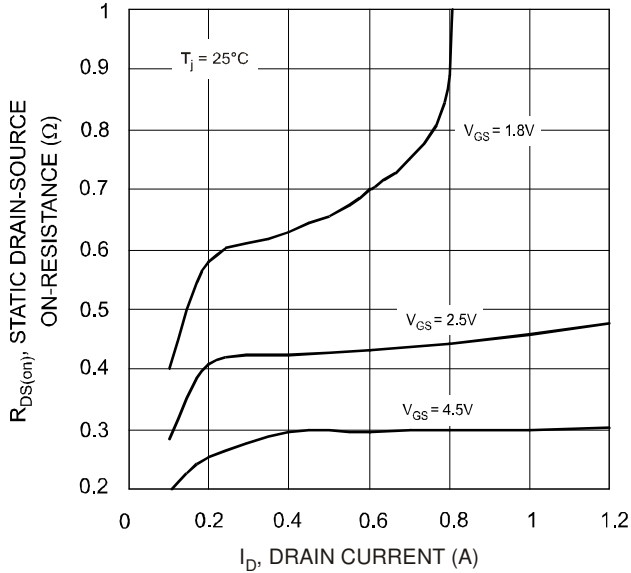


Fig. 7 On-Resistance vs. Drain Current and Gate Voltage

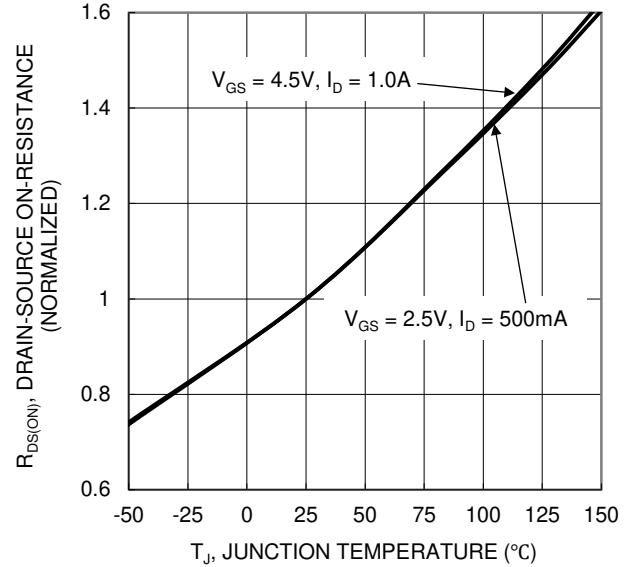


Fig. 8 On-Resistance Variation with Temperature

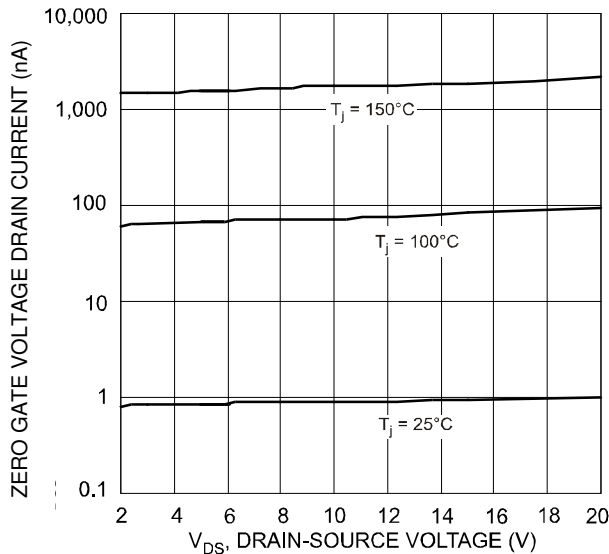


Fig. 9 Drain Source Leakage Current vs. Voltage

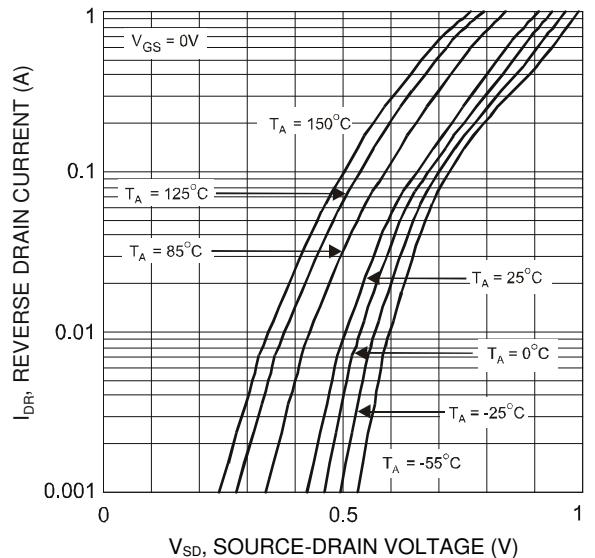


Fig. 10 Reverse Drain Current vs. Source-Drain Voltage

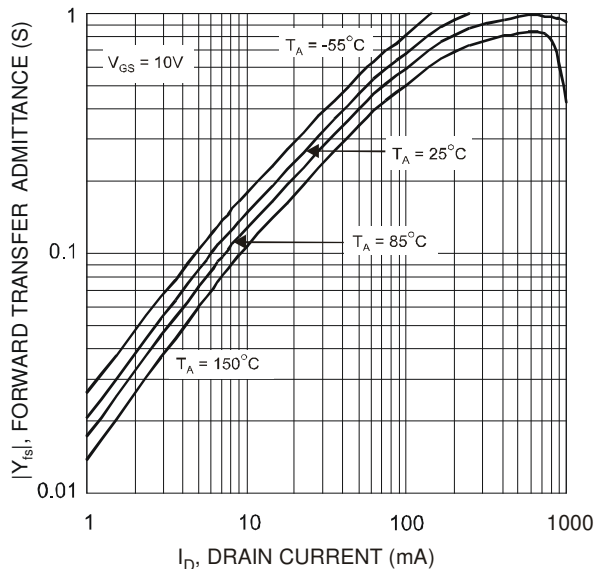


Fig. 11 Forward Transfer Admittance vs. Drain Current

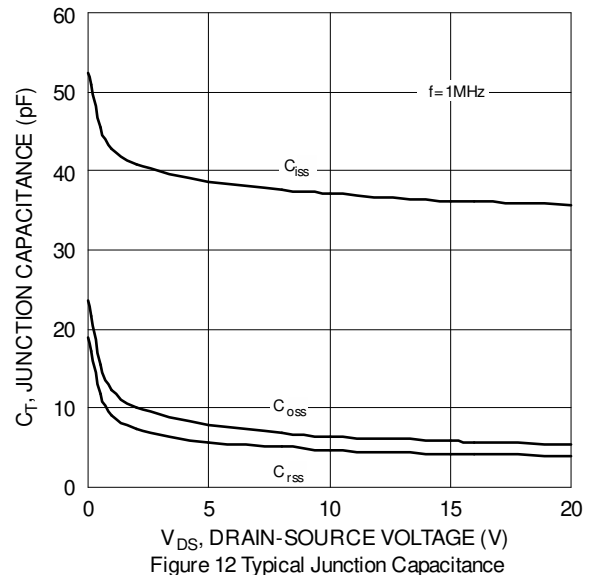
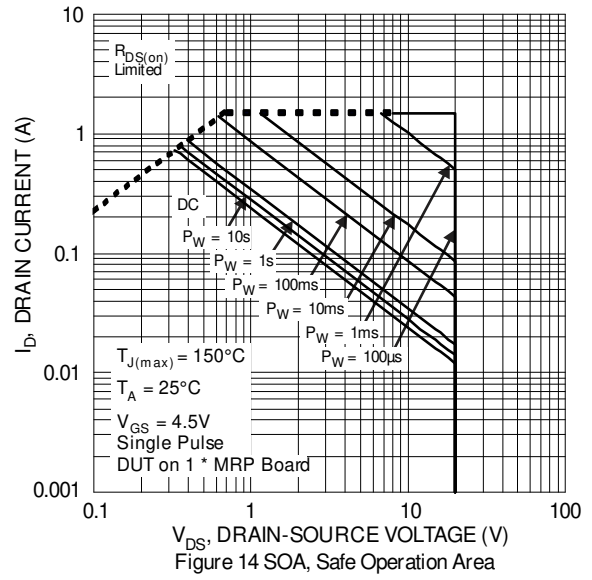
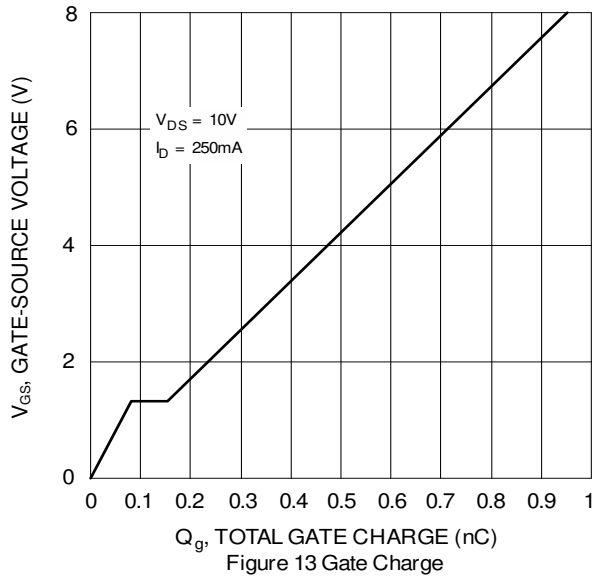
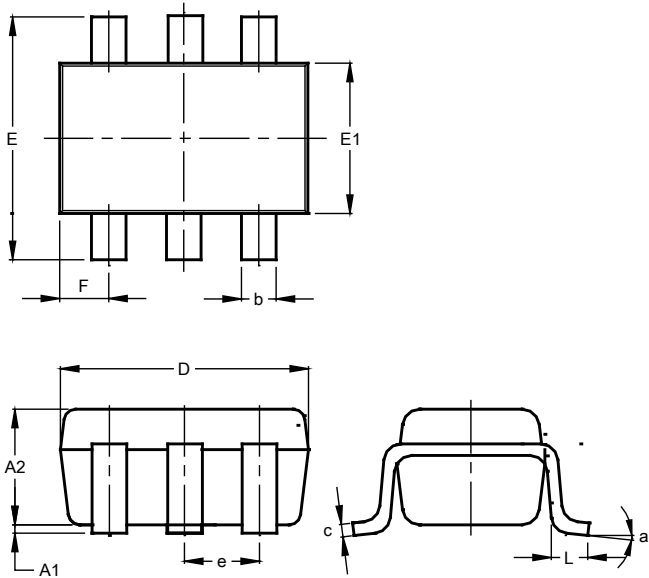


Figure 12 Typical Junction Capacitance



Package Outline Dimensions

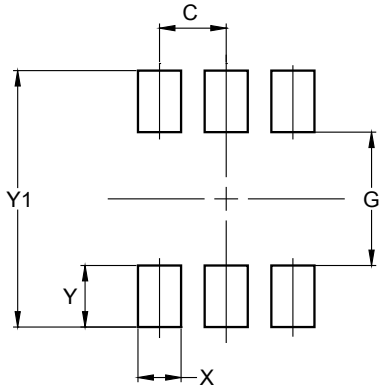
Please see <http://www.diodes.com/package-outlines.html> for the latest version.



SOT363			
Dim	Min	Max	Typ
A1	0.00	0.10	0.05
A2	0.90	1.00	1.00
b	0.10	0.30	0.25
c	0.10	0.22	0.11
D	1.80	2.20	2.15
E	2.00	2.20	2.10
E1	1.15	1.35	1.30
e	0.650 BSC		
F	0.40	0.45	0.425
L	0.25	0.40	0.30
a	0°	8°	--
All Dimensions in mm			

Suggested Pad Layout

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



Dimensions	Value (in mm)
C	0.650
G	1.300
X	0.420
Y	0.600
Y1	2.500

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