DUAL N-CHANNEL ENHANCEMENT MODE MOSFET

Product Summary

BV_{DSS}	$R_{DS(ON)}$ Max	I_D Max @T_A = +25°C
30V	1.5Ω @ V_{GS} = 4.5V	0.43A
	2.0Ω @ V_{GS} = 2.5V	0.37A
	3.0Ω @ V_{GS} = 1.8V	0.3A
	4.5Ω @ V_{GS} = 1.5V	0.25A

Features and Benefits

- Low On-Resistance
- Low Gate Threshold Voltage
- Low Input Capacitance
- Fast Switching Speed
- Low Input/Output Leakage
- Ultra-Small Surface-Mount Package
- ESD Protected
- **Totally Lead-Free & Fully RoHS Compliant (Notes 1 & 2)**
- **Halogen and Antimony Free. "Green" Device (Note 3)**
- **The DMN31D5UDWQ is suitable for automotive applications requiring specific change control; this part is AEC-Q101 qualified, PPAP capable, and manufactured in IATF 16949 certified facilities.**
  https://www.diodes.com/quality/product-definitions/

Description

This new generation 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.

Applications

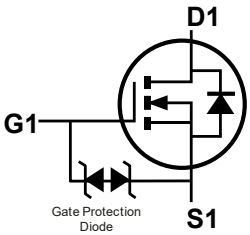
- Battery operated systems and solid-state relays
- Drivers, relays, solenoids, lamps, hammers, displays, memories, transistors
- Power-supply converter circuits

Mechanical Data

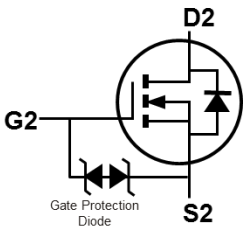
- Package: SOT363
- Package Material: Molded Plastic, "Green" Molding Compound. UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminals: Matte Tin Finish Annealed over Alloy 42 Leadframe (Lead Free Plating). Solderable per MIL-STD-202, Method 208 e3
- Terminal Connections: See Diagram
- Weight: 0.006 grams (Approximate)

SOT363

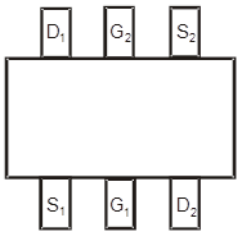
Top View



Q1 N-Channel



Q2 N-Channel



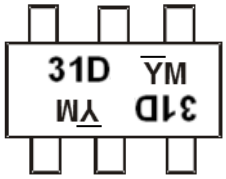
Top View
Pin-out

Ordering Information (Note 4)

Orderable Part Number	Package	Packing	
		Qty.	Carrier
DMN31D5UDWQ-7	SOT363	3,000	Tape & Reel
DMN31D5UDWQ-13	SOT363	10,000	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



31D = Product Type Marking Code
$\overline{Y}$M = Date Code Marking
$\overline{Y}$ = Year (ex: M = 2025)
M = Month (ex: 9 = September)

Date Code Key

Year	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036
Code	M	N	P	R	S	T	U	V	W	X	Y	Z

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	Unit
Drain-Source Voltage			V_{DSS}	30	V
Gate-Source Voltage			V_{GSS}	±12	V
Continuous Drain Current (Note 5) V_{GS} = 4.5V	Steady State	T_A = +25°C T_A = +70°C	I_D	0.43 0.28	A
Maximum Continuous Body Diode Forward Current (Note 5)			I_S	0.37	A
Pulsed Drain Current (10µs Pulse, Duty Cycle = 1%)			I_{DM}	0.65	A

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

Characteristic		Symbol	Value	Unit
Total Power Dissipation (Note 6)	T_A = +25°C	P_D	0.33	W
Thermal Resistance, Junction to Ambient (Note 6)	Steady State	$R_{\theta JA}$	380	°C/W
Total Power Dissipation (Note 5)	T_A = +25°C	P_D	0.43	W
Thermal Resistance, Junction to Ambient (Note 5)	Steady State	$R_{\theta JA}$	290	°C/W
Operating and Storage Temperature Range		T_J, T_{STG}	-55 to +150	°C

Notes: 5. Device mounted on FR-4 substrate PC board, 2oz copper, with 1inch square copper plate.
6. Device mounted on FR-4 substrate PC board, 2oz copper, with minimum recommended pad layout.

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

Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
OFF CHARACTERISTICS (Note 7)						
Drain-Source Breakdown Voltage	BV_{DSS}	30	—	—	V	V_{GS} = 0, I_D = 250μA
Zero Gate Voltage Drain Current @T_C = +25°C	I_{DSS}	—	—	100	nA	V_{DS} = 24V, V_{GS} = 0
Gate-Source Leakage	I_{GSS}	—	—	±10	μA	V_{GS} = ±10V, V_{DS} = 0
ON CHARACTERISTICS (Note 7)						
Gate Threshold Voltage	$V_{GS(TH)}$	0.5	—	0.9	V	V_{DS} = V_{GS}, I_D = 250μA
Static Drain-Source On-Resistance	$R_{DS(ON)}$	—	1.3	1.5	Ω	V_{GS} = 4.5V, I_D = 100mA
			1.4	2.0		V_{GS} = 2.5V, I_D = 50mA
			1.7	3.0		V_{GS} = 1.8V, I_D = 20mA
			1.9	4.5		V_{GS} = 1.5V, I_D = 10mA
Diode Forward Voltage (Note 7)	V_{SD}	—	0.7	1.0	mV	V_{GS} = 0, I_S = 100mA
DYNAMIC CHARACTERISTICS (Note 8)						
Input Capacitance	C_{iss}	—	15.4	—	pF	V_{DS} = 15V, V_{GS} = 0 f = 1.0MHz
Output Capacitance	C_{oss}	—	8	—	pF	
Reverse Transfer Capacitance	C_{rss}	—	5	—	pF	
Total Gate Charge	Q_g	—	0.3	—	nC	V_{GS} = 4.5V, V_{DS} = 15V I_D = 200mA
Gate-Source Charge	Q_{gs}	—	0.05	—	nC	
Gate-Drain Charge	Q_{gd}	—	0.1	—	nC	
Turn-On Delay Time	$t_{D(ON)}$	—	5.7	—	ns	V_{DD} = 15V, V_{GS} = 4.5V R_G = 2Ω, I_D = 200mA
Turn-On Rise Time	t_R	—	9.1	—	ns	
Turn-Off Delay Time	$t_{D(OFF)}$	—	146	—	ns	
Turn-Off Fall Time	t_F	—	48	—	ns	

Notes: 7. Short duration pulse test used to minimize self-heating effect.
8. Guaranteed by design. Not subject to production testing.

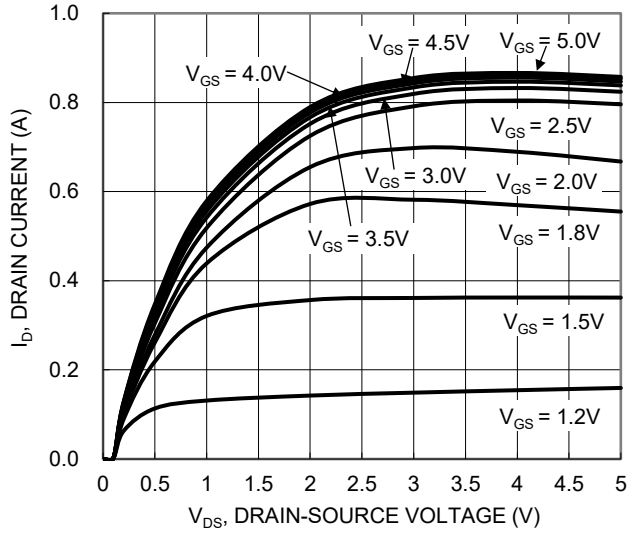


Figure 1. Typical Output Characteristic

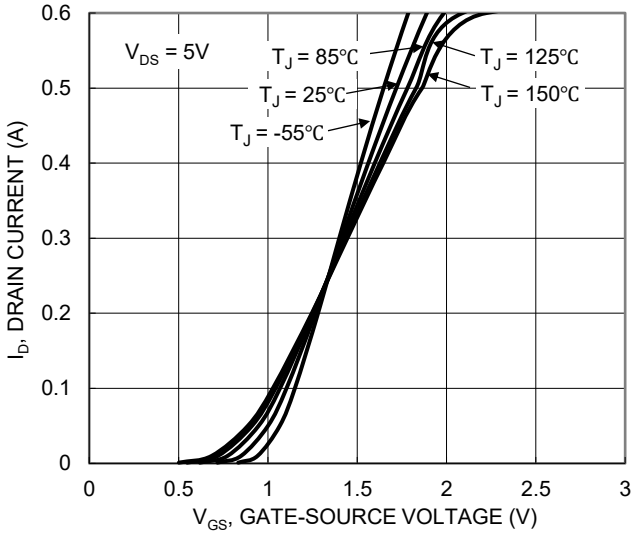


Figure 2. Typical Transfer Characteristic

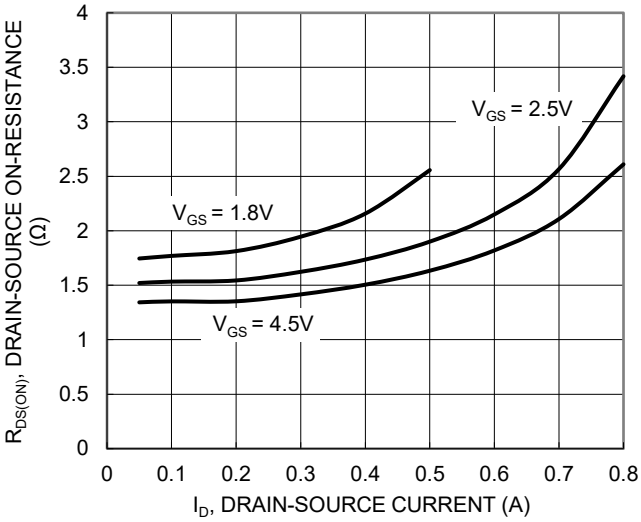


Figure 3. Typical On-Resistance vs. Drain Current and Gate Voltage

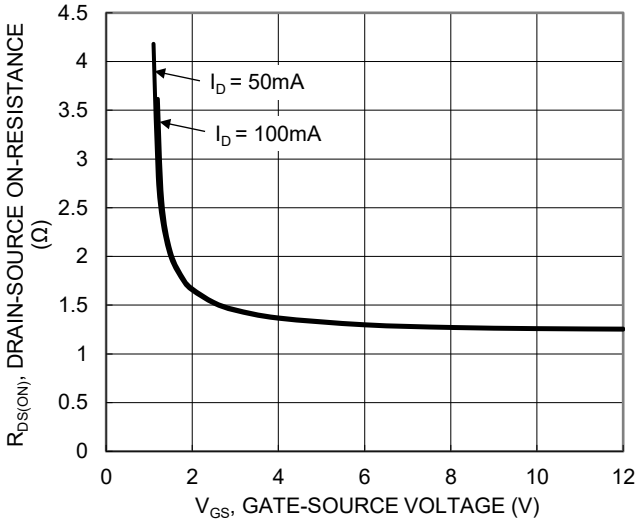


Figure 4. Typical Transfer Characteristic

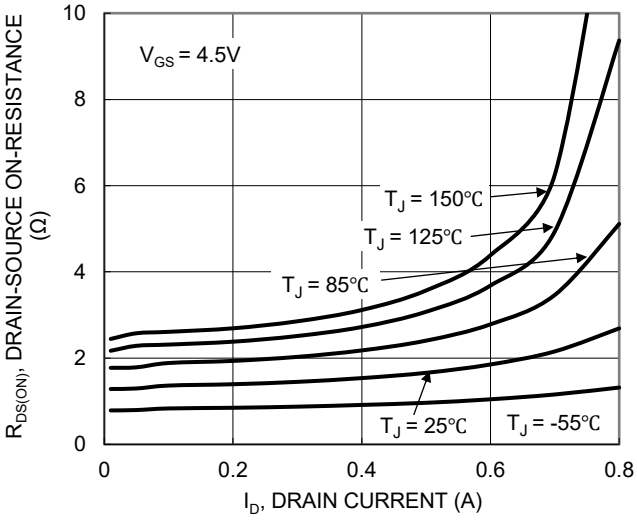


Figure 5. Typical On-Resistance vs. Drain Current and Junction Temperature

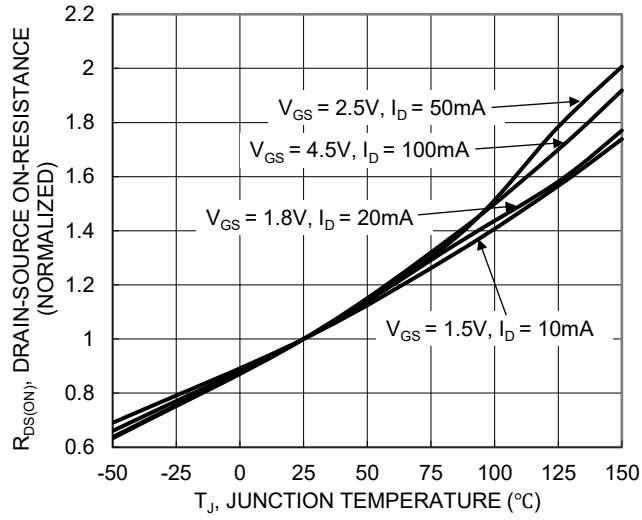


Figure 6. On-Resistance Variation with Junction Temperature

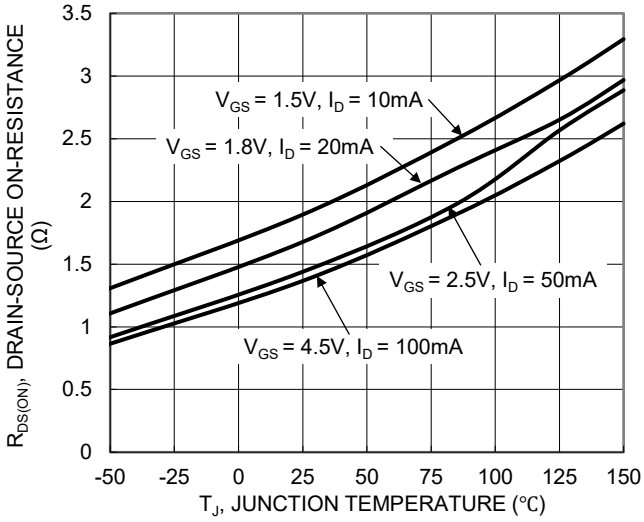


Figure 7. On-Resistance Variation with Junction Temperature

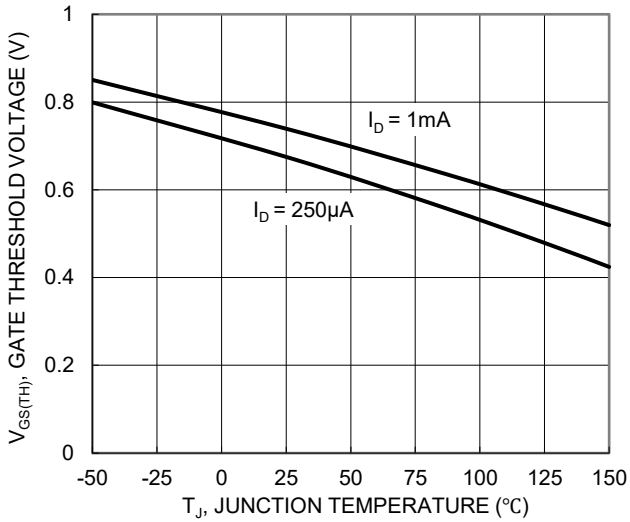


Figure 8. Gate Threshold Variation vs. Junction Temperature

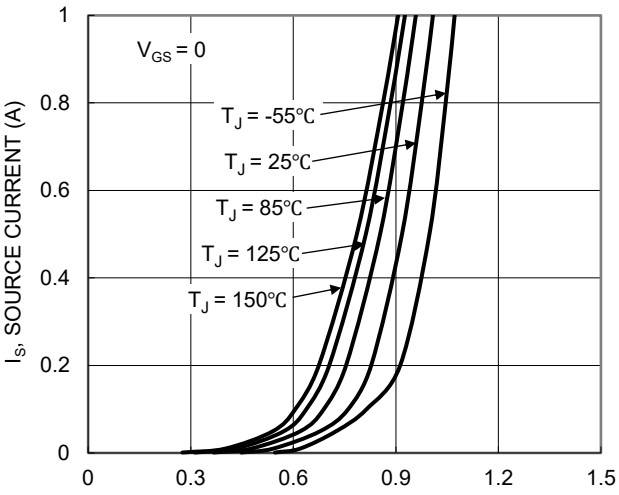


Figure 9. Diode Forward Voltage vs. Current

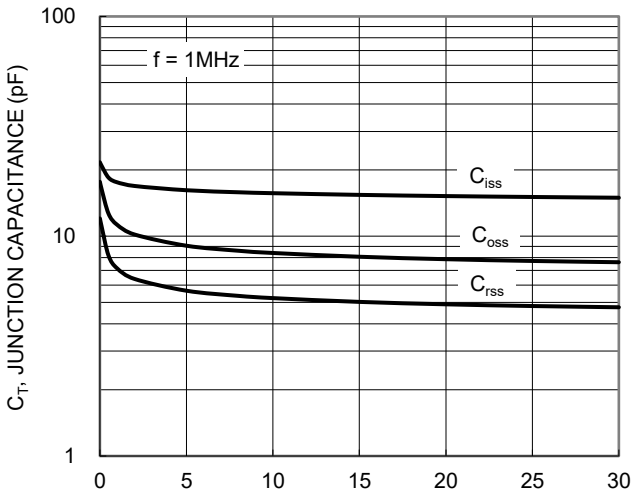


Figure 10. Typical Junction Capacitance

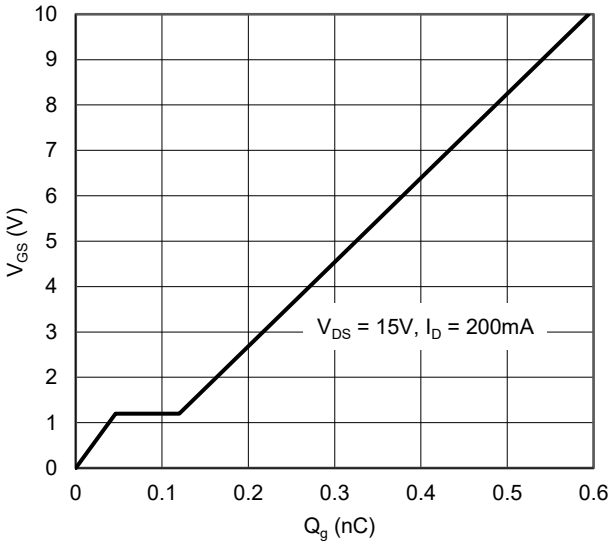


Figure 11. Gate Charge

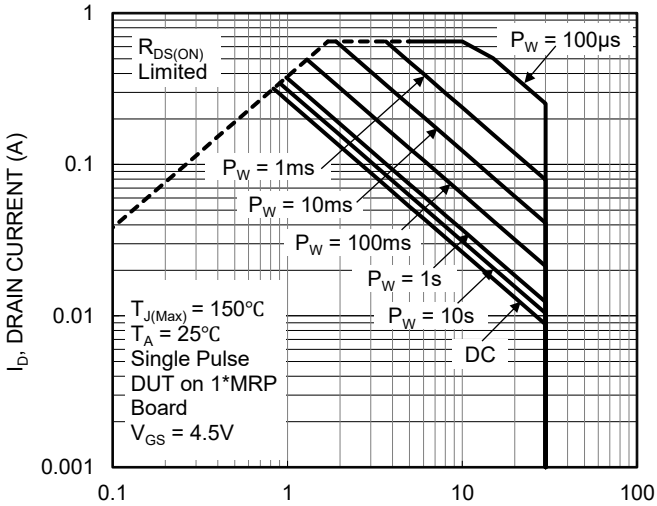


Figure 12. SOA, Safe Operation Area

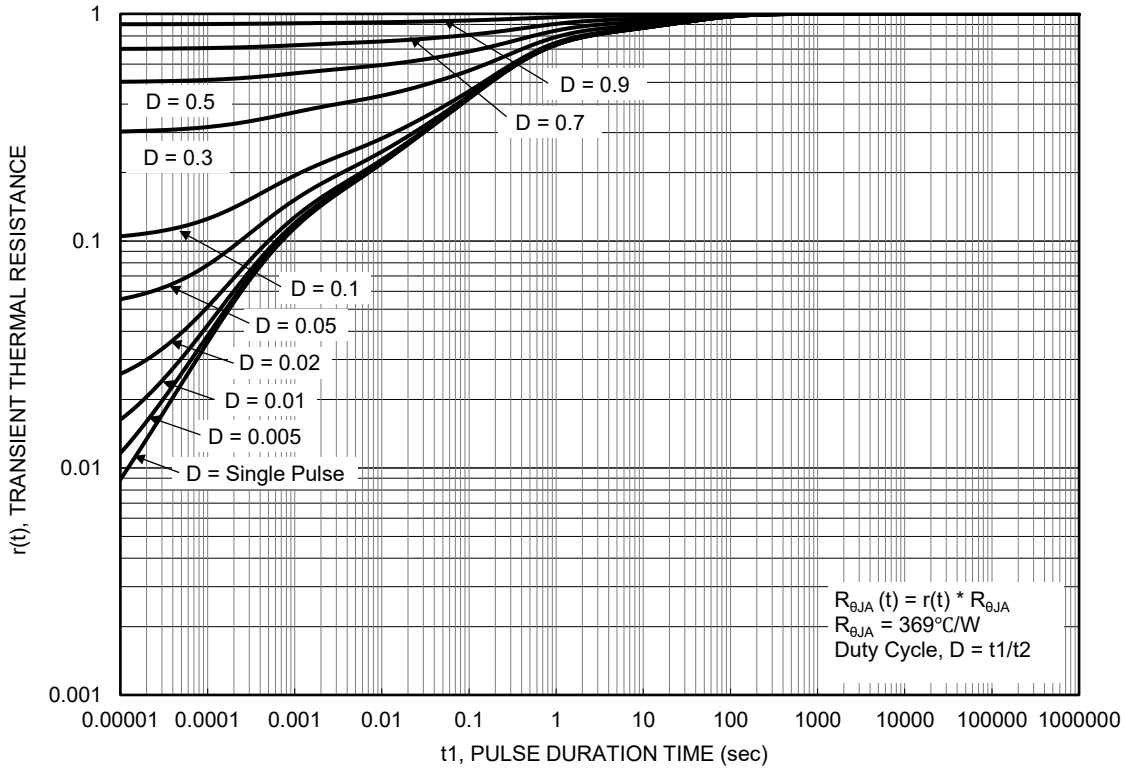


Figure 13. Transient Thermal Resistance

Package Outline Dimensions

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

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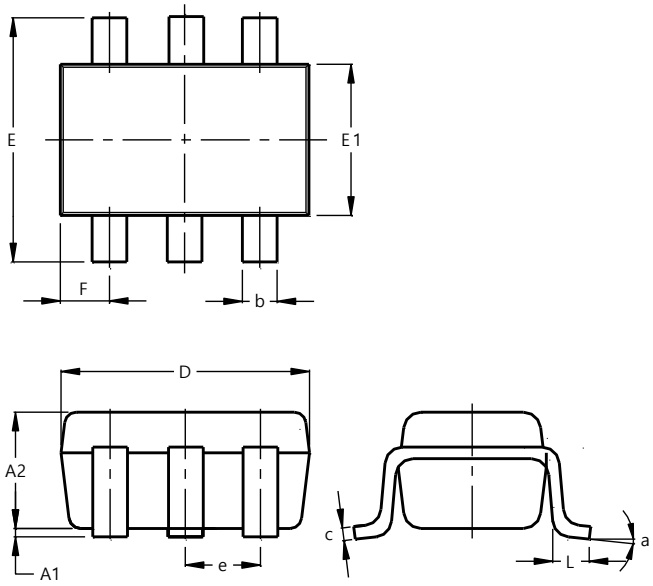
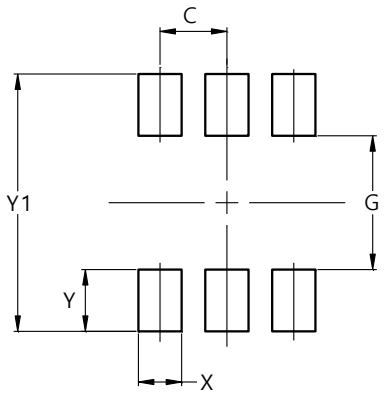


SOT363			
Dim	**Min**	**Max**	**Typ**
A1	0.00	0.10	0.05
A2	0.90	1.00	0.95
b	0.10	0.30	0.25
c	0.10	0.22	0.11
D	1.80	2.20	2.15
E	2.00	2.20	2.10
E1	1.15	1.35	1.30
e	0.650 BSC		
F	0.40	0.45	0.425
L	0.25	0.40	0.30
a	0°	8°	--
All Dimensions in mm			

Suggested Pad Layout

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

SOT363



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

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