

Product Summary

$V_{(BR)DSS}$	$R_{DS(ON)}$ Max	I_D Max $T_A = 25^\circ C$
20V	0.99 Ω @ $V_{GS} = 4.5V$	450mA
	1.2 Ω @ $V_{GS} = 2.5V$	400mA
	1.8 Ω @ $V_{GS} = 1.8V$	330mA
	2.4 Ω @ $V_{GS} = 1.5V$	300mA

Description

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.

Applications

- General Purpose Interfacing Switch
- Power Management Functions
- DC-DC Converters
- Analog Switch

Features

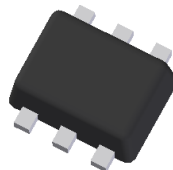
- Dual N-Channel MOSFET
- Low On-Resistance
- Very Low Gate Threshold Voltage, 1.0V Max
- Low Input Capacitance
- Fast Switching Speed
- Ultra-Small Surface Mount Package 1mm x 1mm
- Low Package Profile, 0.45mm Maximum Package Height
- ESD Protected Gate
- **Totally Lead-Free & Fully RoHS Compliant (Notes 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 ([DMN2990UDJQ](#))**

Mechanical Data

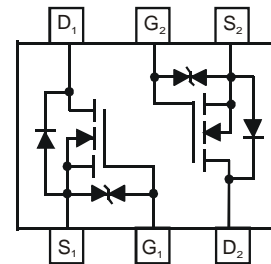
- Case: SOT963
- Case Material: Molded Plastic, "Green" Molding Compound. UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminal Connections Indicator: See Diagram
- Terminals: Finish — Matte Tin Annealed over Copper Leadframe. Solderable per MIL-STD-202, Method 208 E^3
- Weight: 0.027 grams (Approximate)



SOT963



Top View



Top View
Schematic and Transistor Diagram

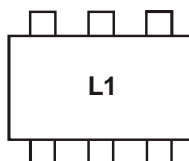
Ordering Information (Note 4)

Part Number	Case	Packaging
DMN2990UDJ-7	SOT963	10K/Tape & Reel
DMN2990UDJ-7A	SOT963	10K/Tape & Reel

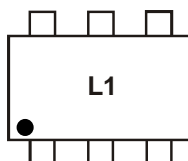
- Notes:
1. No purposely added lead. Fully EU Directive 2002/95/EC (RoHS) & 2011/65/EU (RoHS 2) compliant.
 2. See http://www.diodes.com/quality/lead_free.html for more information about Diodes Incorporated's definitions of Halogen- and Antimony-free, "Green" and Lead-free.
 3. Halogen- and Antimony-free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

Marking Information (Note 5 & 6)

DMN2990UDJ-7 (Note 5)



DMN2990UDJ-7A (Note 6)



L1 = Product Type Marking Code

- Notes:
5. Package is non-polarized. Parts may be on reel in orientation illustrated, 180° rotated, or mixed (both ways).
 6. Part number with suffix 7A designates devices marked with a Pin 1 indicator. There is no other difference between both devices.

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
Continuous Drain Current (Note 7) $V_{GS} = 4.5\text{V}$	Steady State	$T_A = +25^\circ\text{C}$	I_D	450	mA
		$T_A = +70^\circ\text{C}$		350	
Continuous Drain Current (Note 7) $V_{GS} = 1.8\text{V}$	Steady State	$T_A = +25^\circ\text{C}$	I_D	330	mA
		$T_A = +70^\circ\text{C}$		220	
Pulsed Drain Current (Note 8)			I_{DM}	800	mA

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

Characteristic	Symbol	Value	Unit
Total Power Dissipation (Note 7)	P_D	350	mW
Thermal Resistance, Junction to Ambient	$R_{\theta JA}$	360	$^\circ\text{C/W}$
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 9)						
Drain-Source Breakdown Voltage	BV_{DSS}	20	-	-	V	$V_{GS} = 0\text{V}, I_D = 250\mu\text{A}$
Zero Gate Voltage Drain Current @ $T_C = +25^\circ\text{C}$	I_{DSS}	-	-	50	nA	$V_{DS} = 5\text{V}, V_{GS} = 0\text{V}$
		-	-	100		$V_{DS} = 16\text{V}, V_{GS} = 0\text{V}$
Gate-Source Leakage	I_{GSS}	-	-	± 100	nA	$V_{GS} = \pm 5\text{V}, V_{DS} = 0\text{V}$
ON CHARACTERISTICS (Note 9)						
Gate Threshold Voltage	$V_{GS(TH)}$	0.4	-	1.0	V	$V_{DS} = V_{GS}, I_D = 250\mu\text{A}$
Static Drain-Source On-Resistance	$R_{DS(ON)}$	-	0.60	0.99	Ω	$V_{GS} = 4.5\text{V}, I_D = 100\text{mA}$
		-	0.75	1.2		$V_{GS} = 2.5\text{V}, I_D = 50\text{mA}$
		-	0.90	1.8		$V_{GS} = 1.8\text{V}, I_D = 20\text{mA}$
		-	1.2	2.4		$V_{GS} = 1.5\text{V}, I_D = 10\text{mA}$
		-	2.0	-		$V_{GS} = 1.2\text{V}, I_D = 1\text{mA}$
Forward Transfer Admittance	$ Y_{fs} $	180	-	-	ms	$V_{DS} = 10\text{V}, I_D = 400\text{mA}$
Diode Forward Voltage (Note 8)	V_{SD}	-	0.6	1.0	V	$V_{GS} = 0\text{V}, I_S = 150\text{mA}$
DYNAMIC CHARACTERISTICS (Note 10)						
Input Capacitance	C_{iss}	-	27.6	-	pF	$V_{DS} = 16\text{V}, V_{GS} = 0\text{V}, f = 1.0\text{MHz}$
Output Capacitance	C_{oss}	-	4.0	-	pF	
Reverse Transfer Capacitance	C_{rss}	-	2.8	-	pF	
Total Gate Charge	Q_g	-	0.5	-	nC	$V_{GS} = 4.5\text{V}, V_{DS} = 10\text{V}, I_D = 250\text{mA}$
Gate-Source Charge	Q_{gs}	-	0.07	-	nC	
Gate-Drain Charge	Q_{gd}	-	0.07	-	nC	
Turn-On Delay Time	$t_{D(ON)}$	-	4.0	-	ns	$V_{DD} = 10\text{V}, V_{GS} = 4.5\text{V}, R_L = 47\Omega, R_g = 10\Omega, I_D = 200\text{mA}$
Turn-On Rise Time	t_R	-	3.3	-	ns	
Turn-Off Delay Time	$t_{D(OFF)}$	-	19.0	-	ns	
Turn-Off Fall Time	t_F	-	6.4	-	ns	

- Notes:
7. Device mounted on FR-4 PCB, with minimum recommended pad layout.
 8. Device mounted on minimum recommended pad layout test board, 10 μs pulse duty cycle = 1%.
 9. Short duration pulse test used to minimize self-heating effect.
 10. Guaranteed by design. Not subject to product testing.

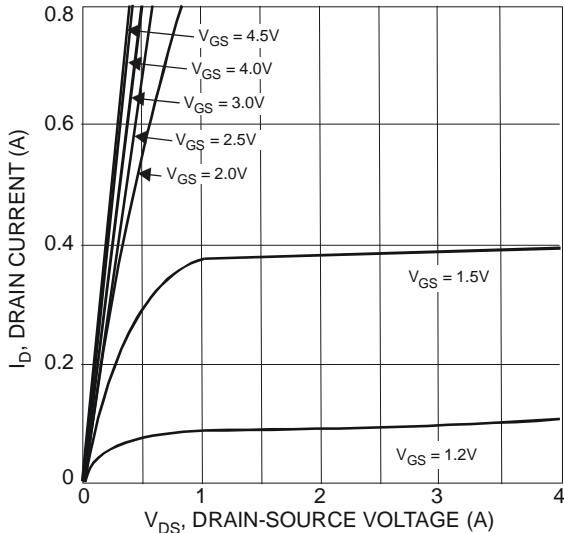


Fig. 1 Typical Output Characteristics

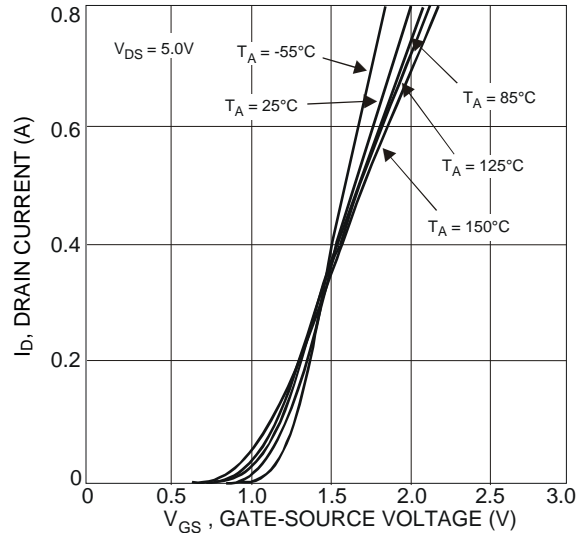


Fig. 2 Typical Transfer Characteristics

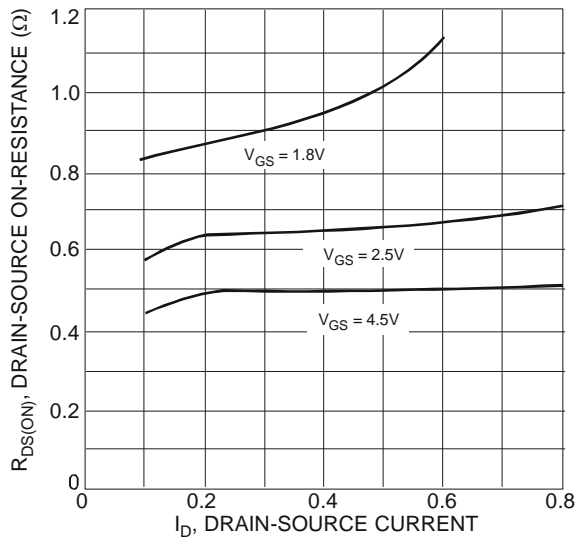


Fig. 3 Typical On-Resistance vs. Drain Current and Gate Voltage

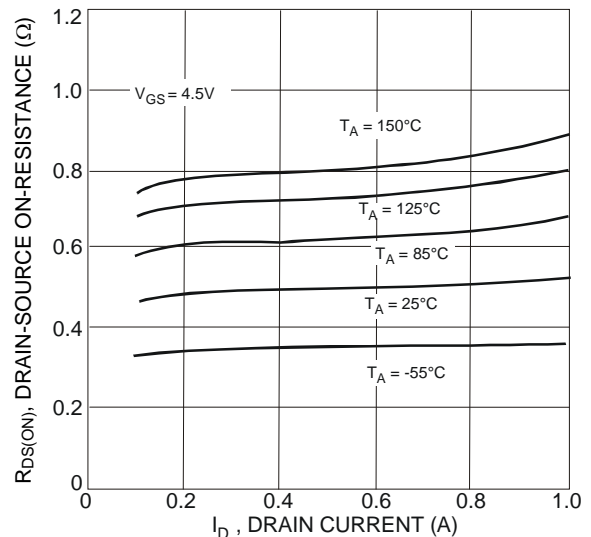


Fig. 4 Typical On-Resistance vs. Drain Current and Temperature

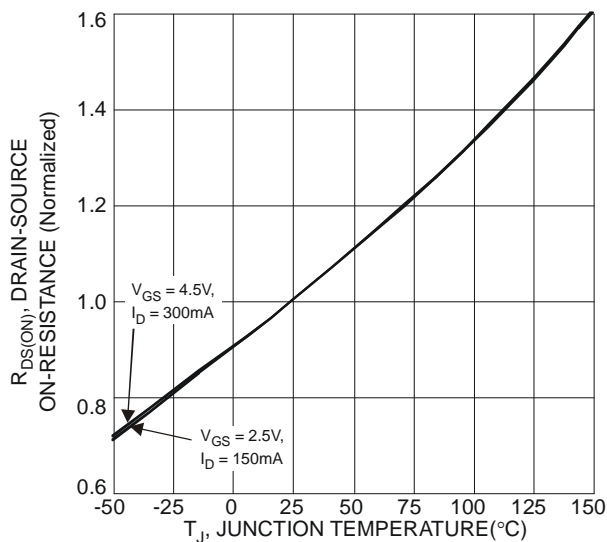


Fig. 5 On-Resistance Variation with Temperature

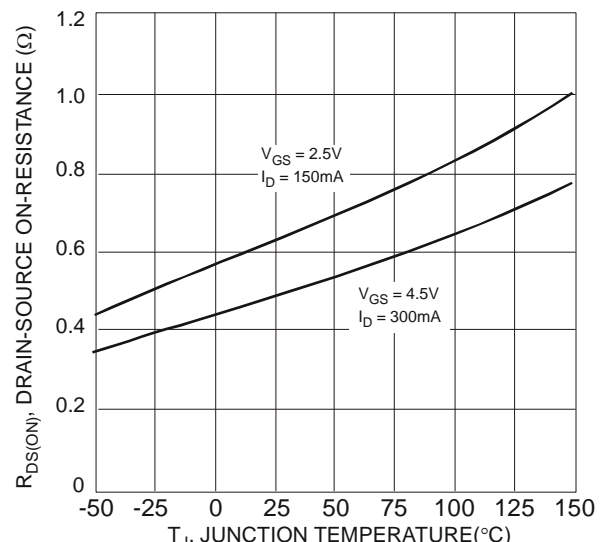


Fig. 6 On-Resistance Variation with Temperature

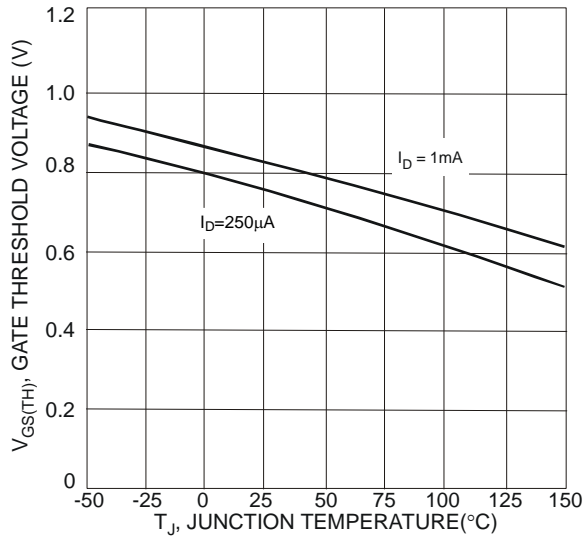


Fig. 7 Gate Threshold Variation vs. Ambient Temperature

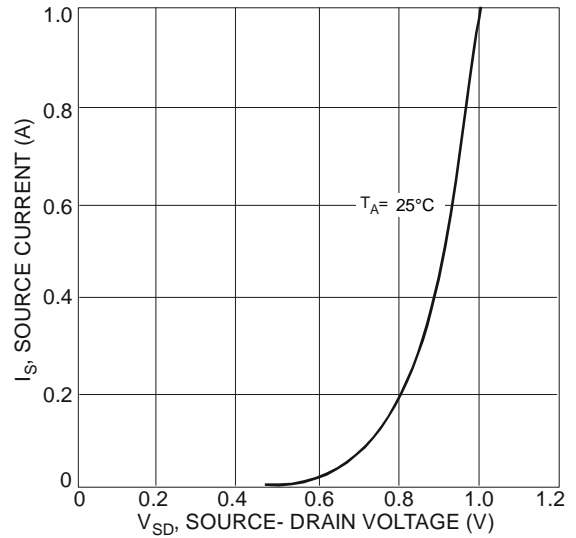


Fig. 8 Diodes Forward Voltage vs. Current

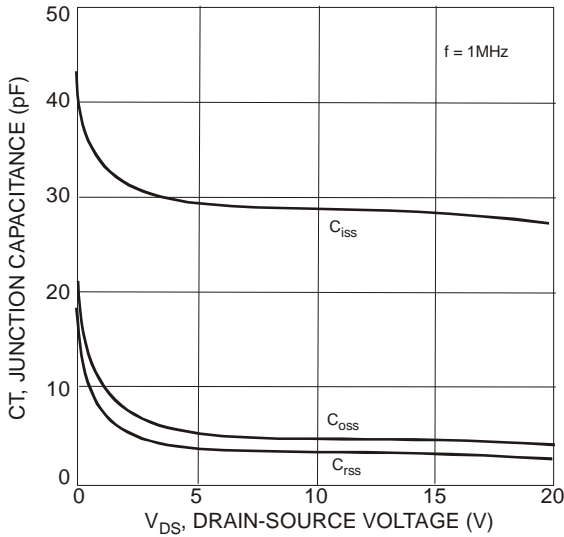


Fig. 9 Typical Junction Capacitance

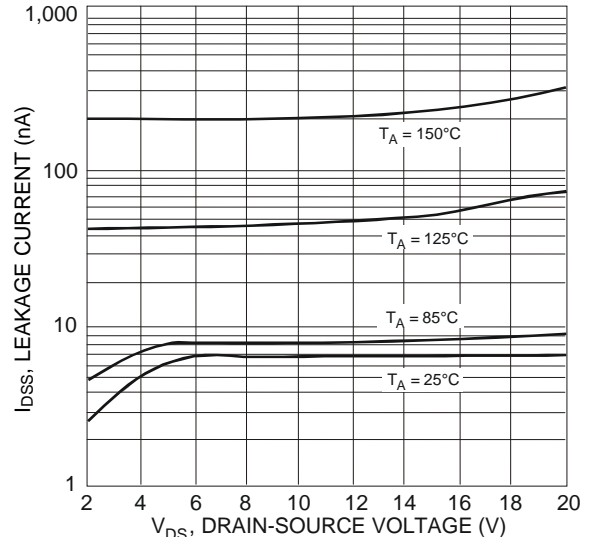


Fig. 10 Typical Drain-Source Leakage Current vs. Voltage

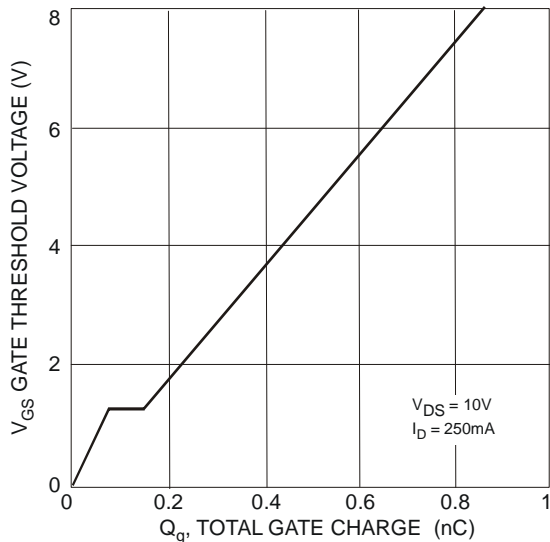


Fig. 11 Gate Charge

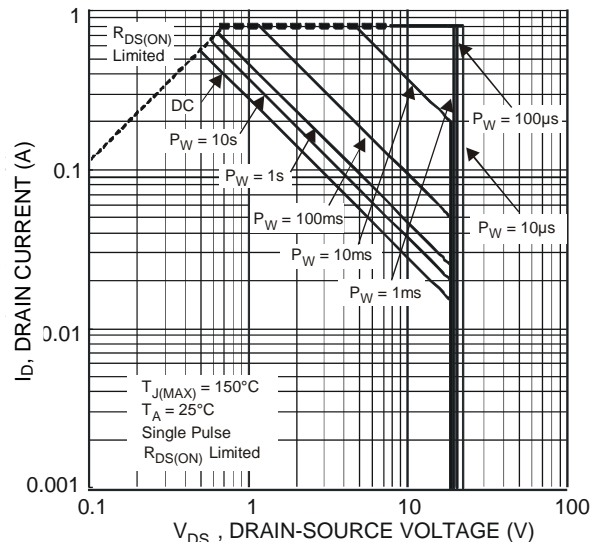
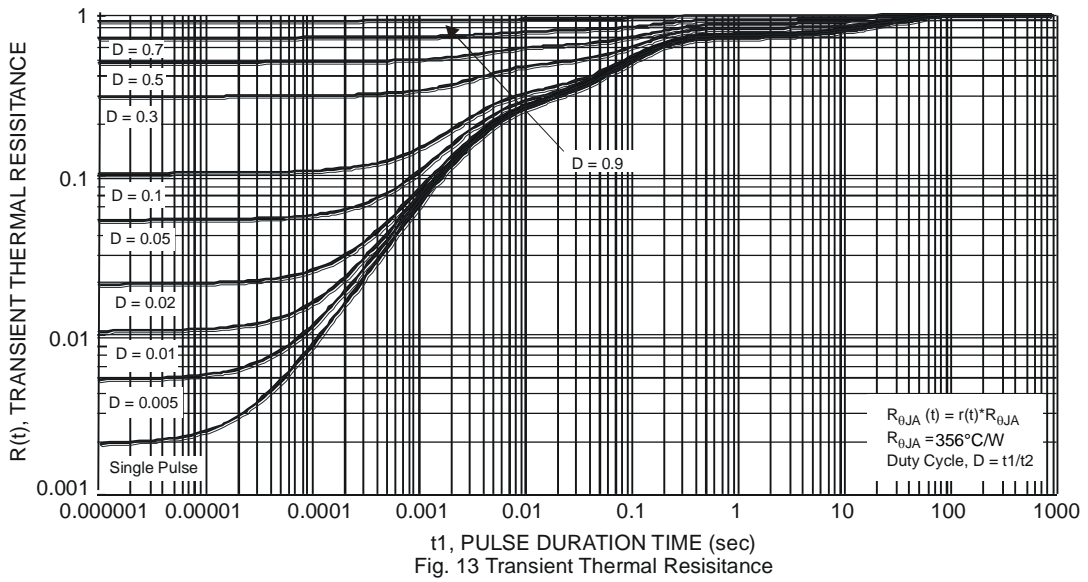


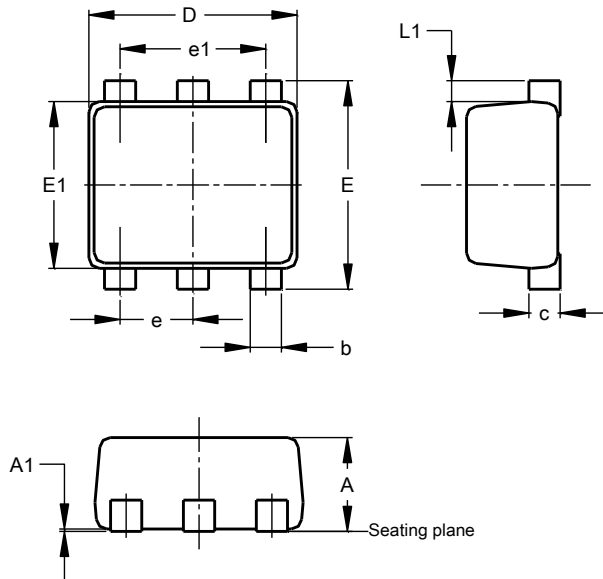
Fig. 12 SOA, Safe Operation Area



Package Outline Dimensions

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

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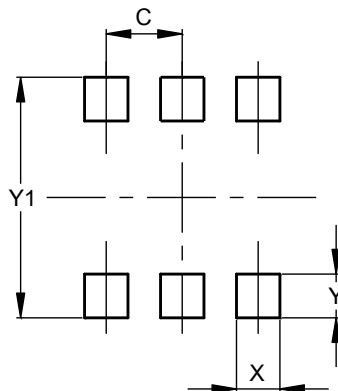


SOT963			
Dim	Min	Max	Typ
A	0.40	0.50	0.45
A1	0.00	0.05	--
b	0.10	0.20	0.15
c	0.120	0.180	0.150
D	0.95	1.05	1.00
E	0.95	1.05	1.00
E1	0.75	0.85	0.80
e	--	--	0.35
e1	--	--	0.70
L1	0.05	0.15	0.10
All Dimensions in mm			

Suggested Pad Layout

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

SOT963



Dimensions	Value (in mm)
C	0.350
X	0.200
Y	0.200
Y1	1.100

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