

## Product Summary

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

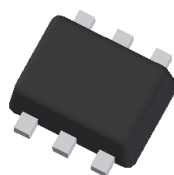
- Dual N-Channel MOSFET
- Low On-Resistance
- Very Low Gate Threshold Voltage, 1.0V Max
- Low Input Capacitance
- Fast Switching Speed
- Ultra-Small Surface Mount Package 1mm x 1mm
- Low Package Profile, 0.45mm Maximum Package Height
- ESD Protected Gate
- Totally Lead-Free & Fully RoHS Compliant (Notes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

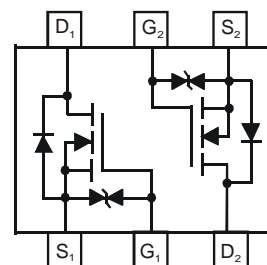
- Case: SOT963
- Case Material: Molded Plastic, "Green" Molding Compound. UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminal Connections Indicator: See Diagram
- Terminals: Finish — Matte Tin Annealed over Copper Leadframe. Solderable per MIL-STD-202,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



SOT963



Top View


 Top View  
 Schematic and Transistor Diagram

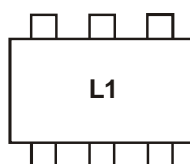
## Ordering Information (Note 4)

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

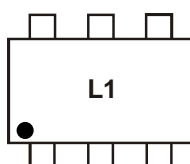
- Notes:
- No purposely added lead. Fully EU Directive 2002/95/EC (RoHS) & 2011/65/EU (RoHS 2) compliant.
  - See [http://www.diodes.com/quality/lead\\_free.html](http://www.diodes.com/quality/lead_free.html) for more information about Diodes Incorporated's definitions of Halogen- and Antimony-free, "Green" and Lead-free.
  - Halogen- and Antimony-free "Green" products are defined as those which contain <900ppm bromine, <900ppm chlorine (<1500ppm total Br + Cl) and <1000ppm antimony compounds.
  - 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:
- Package is non-polarized. Parts may be on reel in orientation illustrated, 180° rotated, or mixed (both ways).
  - Part number with suffix 7A designates devices marked with a Pin 1 indicator. There is no other difference between both devices.

**Maximum Ratings** (@T<sub>A</sub> = +25°C, unless otherwise specified.)

Characteristic			Symbol	Value	Unit
Drain-Source Voltage			V <sub>DSS</sub>	20	V
Gate-Source Voltage			V <sub>GSS</sub>	±8	V
Continuous Drain Current (Note 7) V <sub>GS</sub> = 4.5V	Steady State	T <sub>A</sub> = +25°C	I <sub>D</sub>	450	mA
		T <sub>A</sub> = +70°C		350	
Continuous Drain Current (Note 7) V <sub>GS</sub> = 1.8V	Steady State	T <sub>A</sub> = +25°C	I <sub>D</sub>	330	mA
		T <sub>A</sub> = +70°C		220	
Pulsed Drain Current (Note 8)			I <sub>DM</sub>	800	mA

**Thermal Characteristics** (@T<sub>A</sub> = +25°C, unless otherwise specified.)

Characteristic	Symbol	Value	Unit
Total Power Dissipation (Note 7)	P <sub>D</sub>	350	mW
Thermal Resistance, Junction to Ambient	R <sub>θJA</sub>	360	°C/W
Operating and Storage Temperature Range	T <sub>J</sub> , T <sub>STG</sub>	-55 to +150	°C

**Electrical Characteristics** (@T<sub>A</sub> = +25°C, unless otherwise specified.)

Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
<b>OFF CHARACTERISTICS (Note 9)</b>						
Drain-Source Breakdown Voltage	BV <sub>DSS</sub>	20	-	-	V	V <sub>GS</sub> = 0V, I <sub>D</sub> = 250μA
Zero Gate Voltage Drain Current @T <sub>C</sub> = +25°C	I <sub>DSS</sub>	-	-	50	nA	V <sub>DS</sub> = 5V, V <sub>GS</sub> = 0V
		-	-	100		V <sub>DS</sub> = 16V, V <sub>GS</sub> = 0V
Gate-Source Leakage	I <sub>GSS</sub>	-	-	±100	nA	V <sub>GS</sub> = ±5V, V <sub>DS</sub> = 0V
<b>ON CHARACTERISTICS (Note 9)</b>						
Gate Threshold Voltage	V <sub>GS(TH)</sub>	0.4	-	1.0	V	V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> = 250μA
Static Drain-Source On-Resistance	R <sub>DS(ON)</sub>	-	0.60	0.99	Ω	V <sub>GS</sub> = 4.5V, I <sub>D</sub> = 100mA
		-	0.75	1.2		V <sub>GS</sub> = 2.5V, I <sub>D</sub> = 50mA
		-	0.90	1.8		V <sub>GS</sub> = 1.8V, I <sub>D</sub> = 20mA
		-	1.2	2.4		V <sub>GS</sub> = 1.5V, I <sub>D</sub> = 10mA
		-	2.0	-		V <sub>GS</sub> = 1.2V, I <sub>D</sub> = 1mA
Forward Transfer Admittance	Y <sub>fs</sub>	180	-	-	ms	V <sub>DS</sub> = 10V, I <sub>D</sub> = 400mA
Diode Forward Voltage (Note 8)	V <sub>SD</sub>	-	0.6	1.0	V	V <sub>GS</sub> = 0V, I <sub>S</sub> = 150mA
<b>DYNAMIC CHARACTERISTICS (Note 10)</b>						
Input Capacitance	C <sub>iss</sub>	-	27.6	-	pF	V <sub>DS</sub> = 16V, V <sub>GS</sub> = 0V, f = 1.0MHz
Output Capacitance	C <sub>oss</sub>	-	4.0	-	pF	
Reverse Transfer Capacitance	C <sub>rss</sub>	-	2.8	-	pF	
Total Gate Charge	Q <sub>g</sub>	-	0.5	-	nC	V <sub>GS</sub> = 4.5V, V <sub>DS</sub> = 10V, I <sub>D</sub> = 250mA
Gate-Source Charge	Q <sub>gs</sub>	-	0.07	-	nC	
Gate-Drain Charge	Q <sub>gd</sub>	-	0.07	-	nC	
Turn-On Delay Time	t <sub>D(ON)</sub>	-	4.0	-	ns	V <sub>DD</sub> = 10V, V <sub>GS</sub> = 4.5V, R <sub>L</sub> = 47Ω, R <sub>g</sub> = 10Ω, I <sub>D</sub> = 200mA
Turn-On Rise Time	t <sub>R</sub>	-	3.3	-	ns	
Turn-Off Delay Time	t <sub>D(OFF)</sub>	-	19.0	-	ns	
Turn-Off Fall Time	t <sub>F</sub>	-	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, 10μs pulse duty cycle = 1%.
  9. Short duration pulse test used to minimize self-heating effect.
  10. Guaranteed by design. Not subject to product testing.

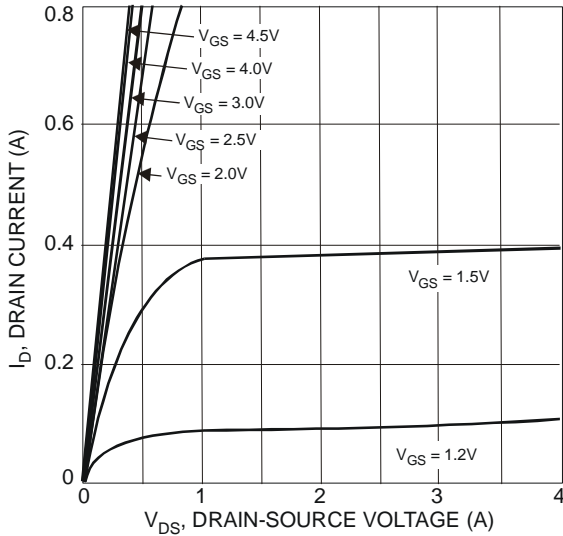


Fig. 1 Typical Output Characteristics

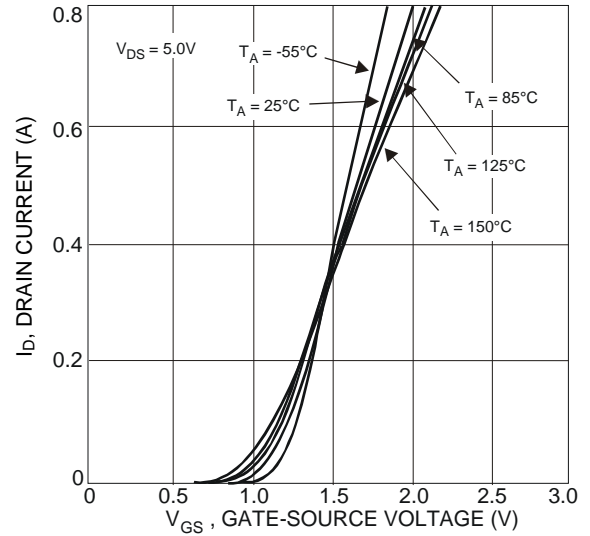


Fig. 2 Typical Transfer Characteristics

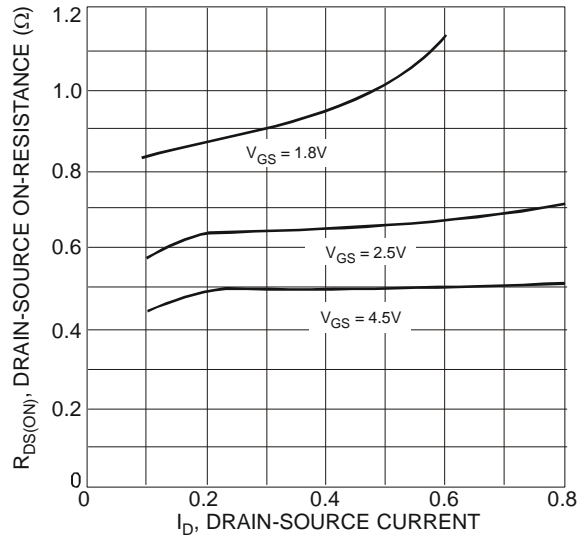


Fig. 3 Typical On-Resistance vs. Drain Current and Gate Voltage

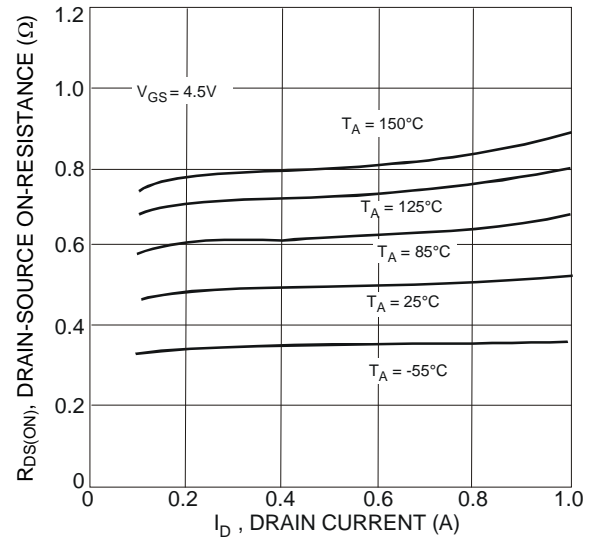


Fig. 4 Typical On-Resistance vs. Drain Current and Temperature

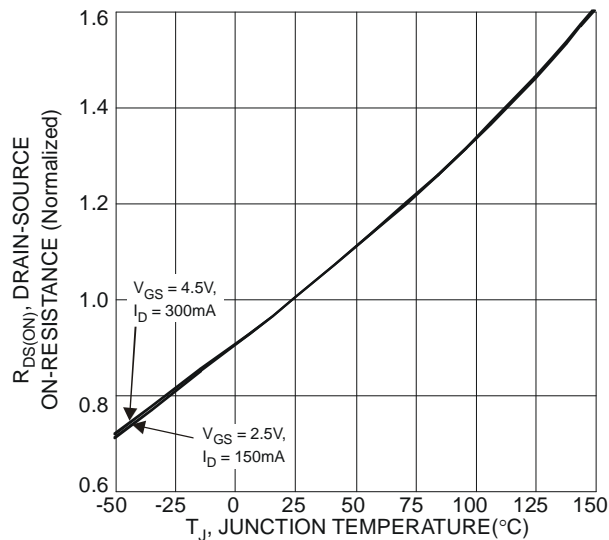


Fig. 5 On-Resistance Variation with Temperature

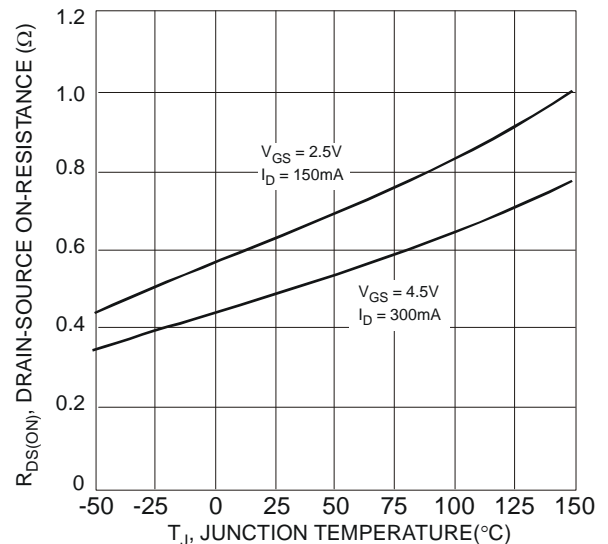


Fig. 6 On-Resistance Variation with Temperature

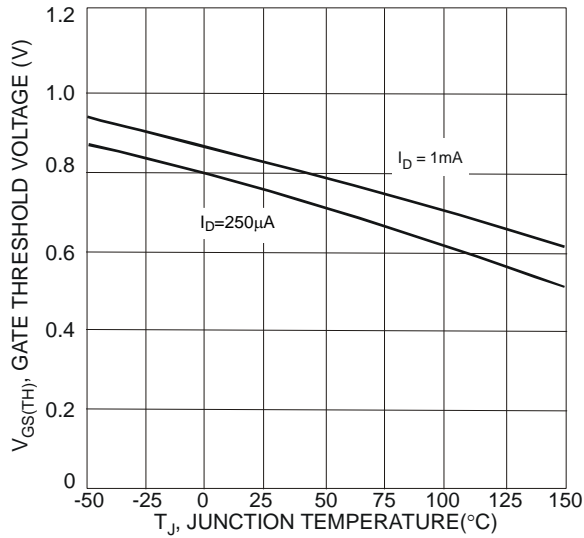


Fig. 7 Gate Threshold Variation vs. Ambient Temperature

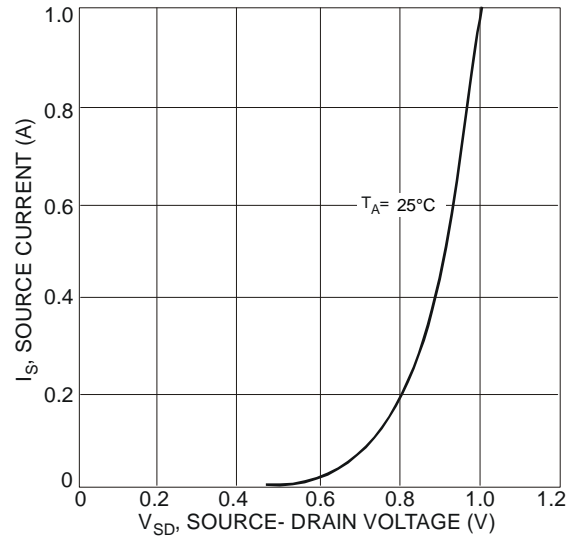


Fig. 8 Diodes Forward Voltage vs. Current

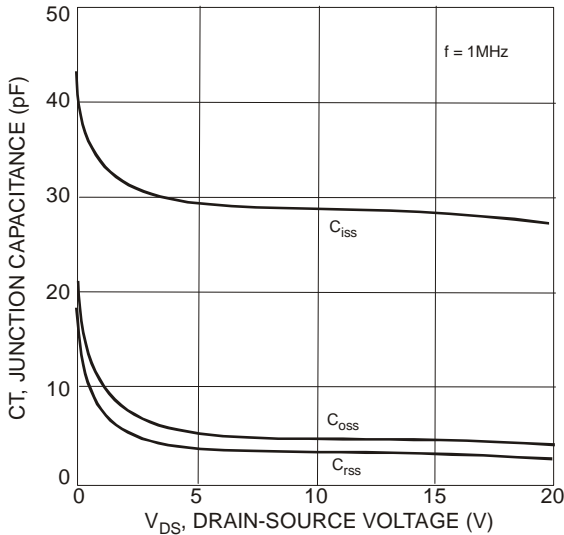


Fig. 9 Typical Junction Capacitance

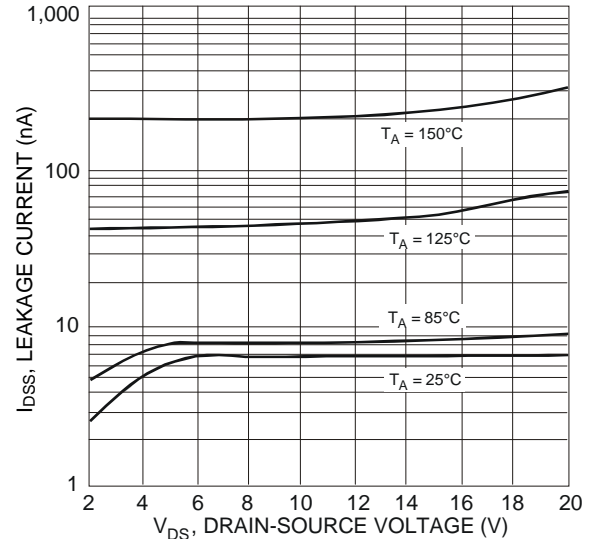


Fig. 10 Typical Drain-Source Leakage Current vs. Voltage

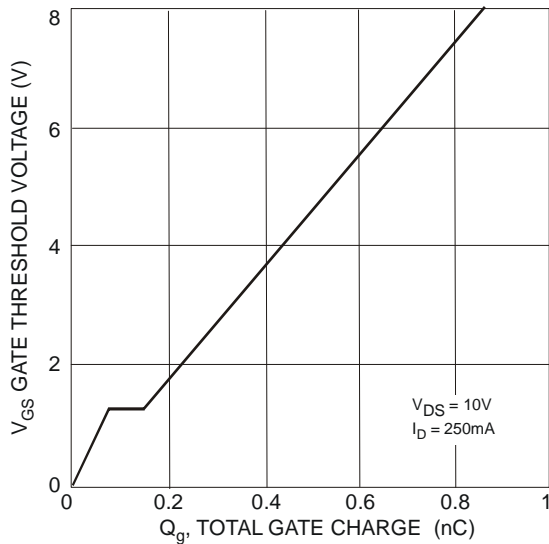


Fig. 11 Gate Charge

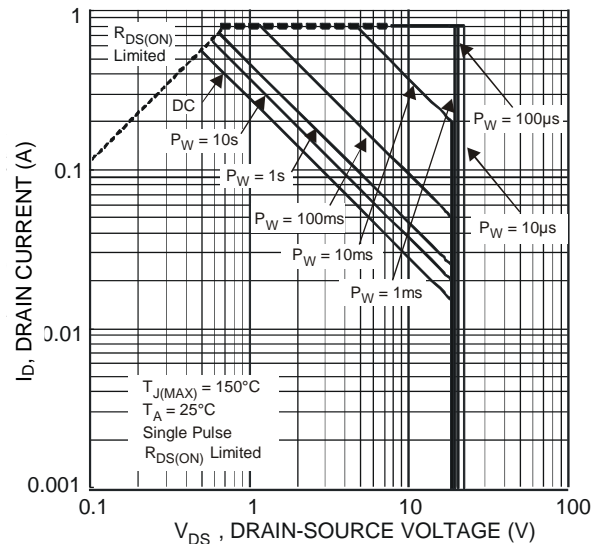
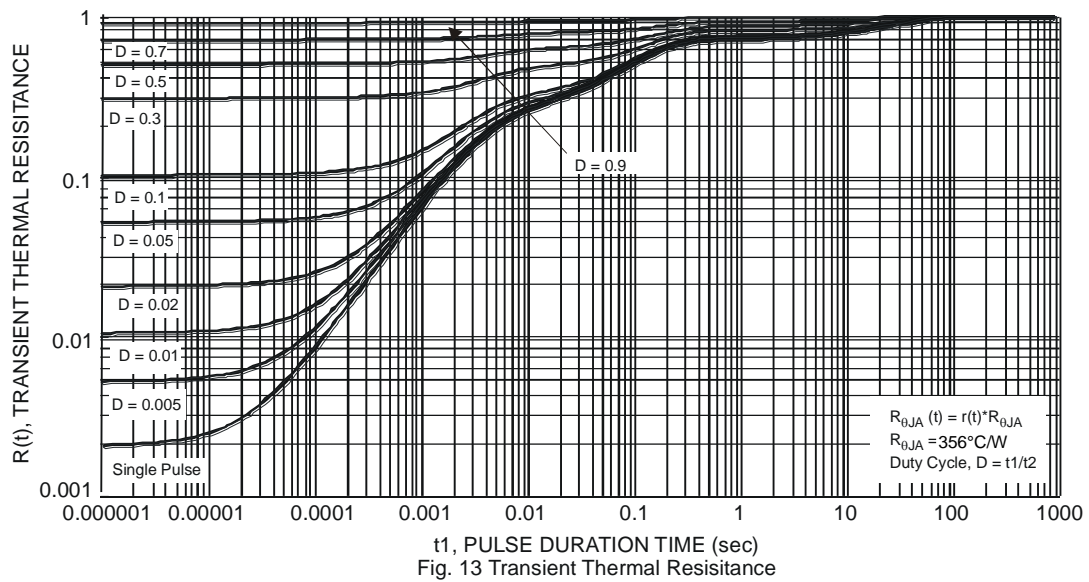


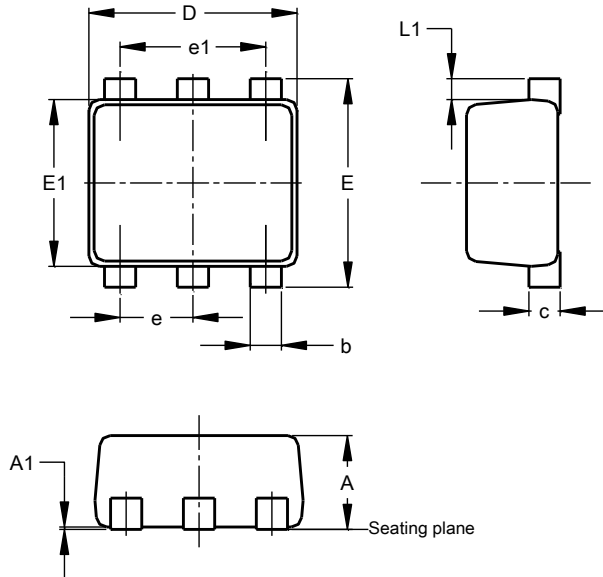
Fig. 12 SOA, Safe Operation Area



## Package Outline Dimensions

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

SOT963

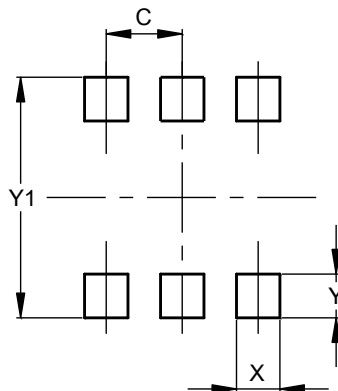


SOT963			
Dim	Min	Max	Typ
A	0.40	0.50	0.45
A1	0.00	0.05	--
b	0.10	0.20	0.15
c	0.120	0.180	0.150
D	0.95	1.05	1.00
E	0.95	1.05	1.00
E1	0.75	0.85	0.80
e	--	--	0.35
e1	--	--	0.70
L1	0.05	0.15	0.10
All Dimensions in mm			

## 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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