

20V N-CHANNEL ENHANCEMENT MODE MOSFET IN SOT23

Product Summary

$V_{(BR)DSS}$	$R_{DS(on)}$	I_D Max (Note 5)
20V	175m Ω @ $V_{GS} = 4.5V$	1.40A @ $T_A = 25^\circ C$
	240m Ω @ $V_{GS} = 2.5V$	1.20A @ $T_A = 25^\circ C$
	360m Ω @ $V_{GS} = 1.8V$	1.0A @ $T_A = 25^\circ C$

Features and Benefits

- On resistance <200m Ω
- Low Gate Threshold Voltage
- Fast Switching Speed
- "Lead Free", RoHS Compliant (Note 1)
- Halogen and Antimony Free. "Green" Device (Note 2)
- ESD Protected Gate 2kV
- Qualified to AEC-Q101 Standards for High Reliability

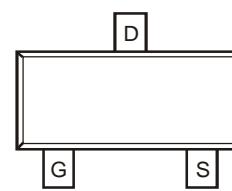
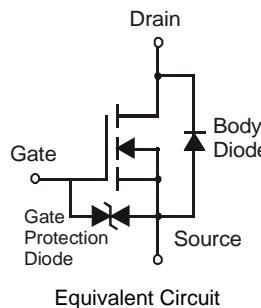
Description and Applications

This MOSFET has been 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: SOT23
- Case Material: Molded Plastic, "Green" Molding Compound. UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminals: Finish – Matte Tin
- Weight: 0.08 grams (approximate)



Top View

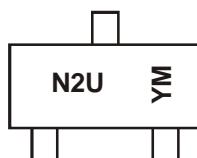
Ordering Information (Note 3)

Part Number	Marking	Reel size (inches)	Tape width (mm)	Quantity per reel
DMN2300U-7	N2U	7	8	3000

Notes:

1. No purposefully added lead
2. Diodes Inc's "Green" policy can be found on our website at <http://www.diodes.com>.
3. For packaging details, go to our website at <http://www.diodes.com>.

Marking Information



N2U = Product Type Marking Code
YM = Date Code Marking
Y = Year (ex: Y = 2011)
M = Month (ex: 9 = September)

Date Code Key

Year	2011	2012	2013	2014	2015	2016	2017					
Code	Y	Z	A	B	C	D	E					
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
Continuous Drain Current	Steady State	$T_A = 25^\circ\text{C}$ (Note 5)	I_D	1.40	A
		$T_A = 85^\circ\text{C}$ (Note 5)		1.01	
		$T_A = 25^\circ\text{C}$ (Note 4)		1.24	
Pulsed Drain Current (Note 6)			I_{DM}	11	A

Thermal Characteristics @ $T_A = 25^\circ\text{C}$ unless otherwise specified

Characteristic		Symbol	Value	Unit
Power Dissipation	(Note 4)	P_D	0.43	W
	(Note 5)		0.55	W
Thermal Resistance, Junction to Ambient	(Note 4)	$R_{\theta JA}$	288	°C/W
	(Note 5)		228	°C/W
Operating and Storage Temperature Range		T_J, T_{STG}	-55 to +150	°C

Notes:

4. Device mounted on FR-4 substrate PC board, 2oz copper, with minimum recommended pad layout
5. Device mounted on 25mm X 25mm square copper plate with FR-4 substrate PC board, 2oz copper
6. Device mounted on minimum recommended pad layout test board, 10μs pulse duty cycle = 1%.

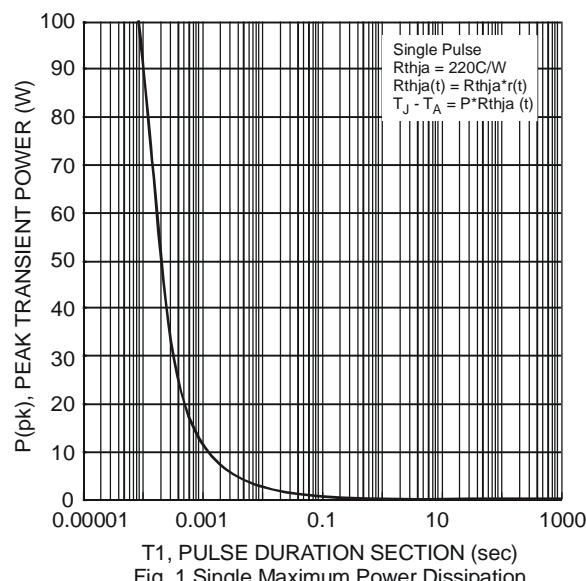
Thermal Characteristics


Fig. 1 Single Maximum Power Dissipation

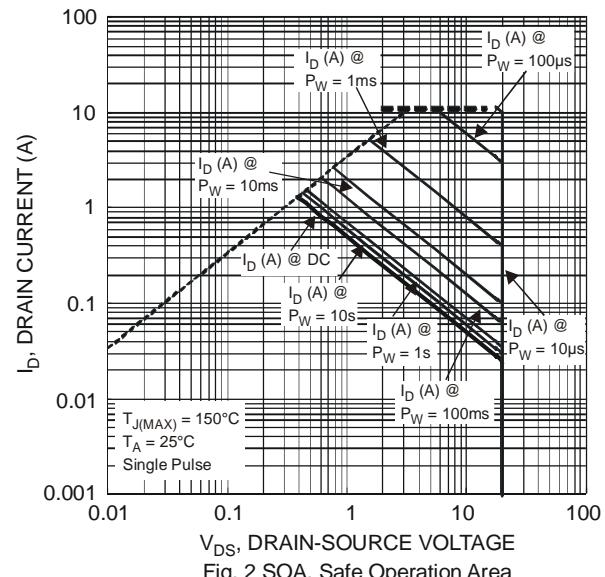


Fig. 2 SOA, Safe Operation Area

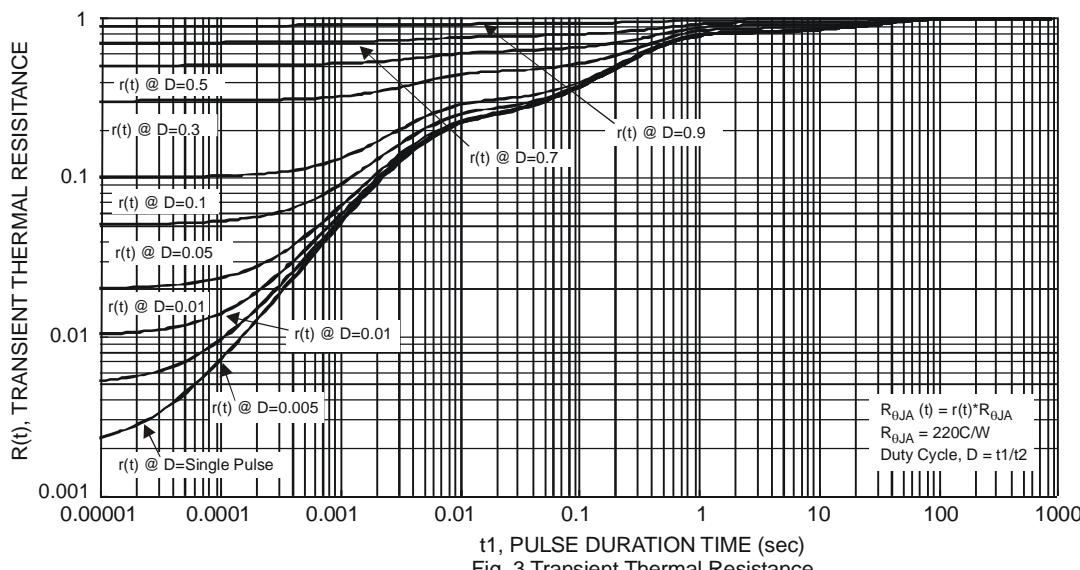


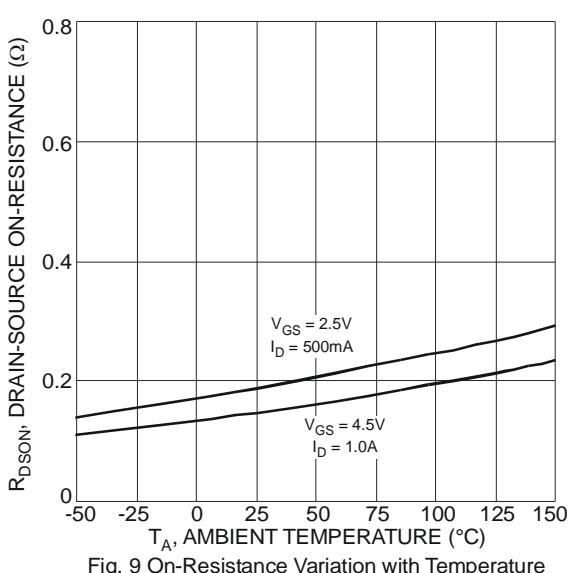
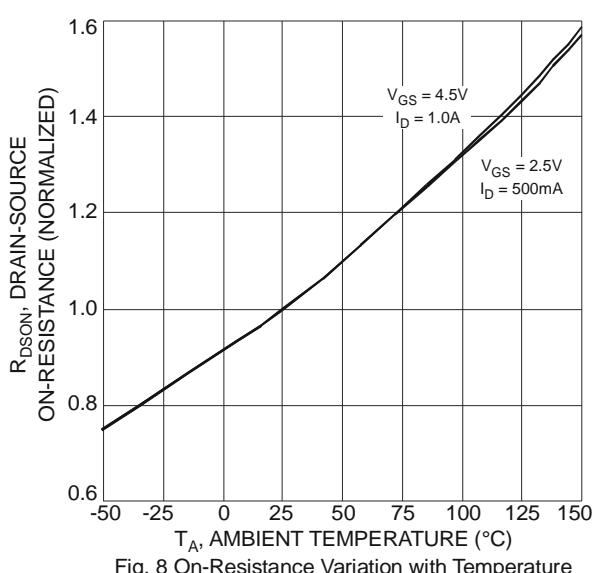
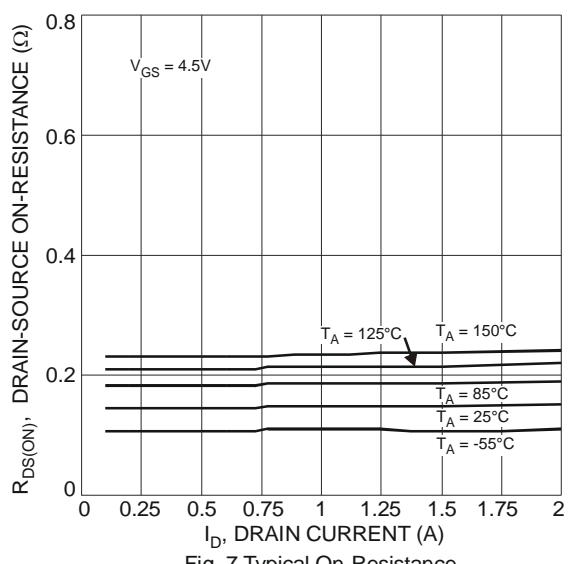
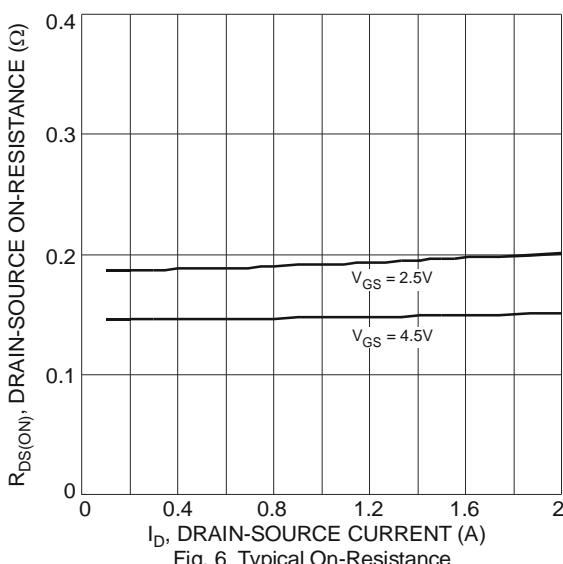
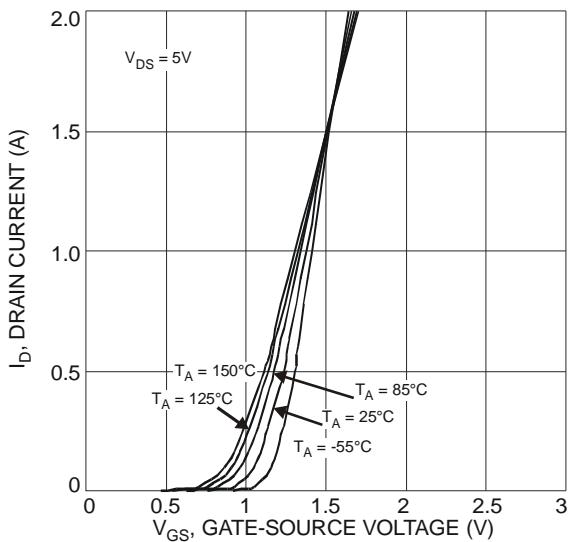
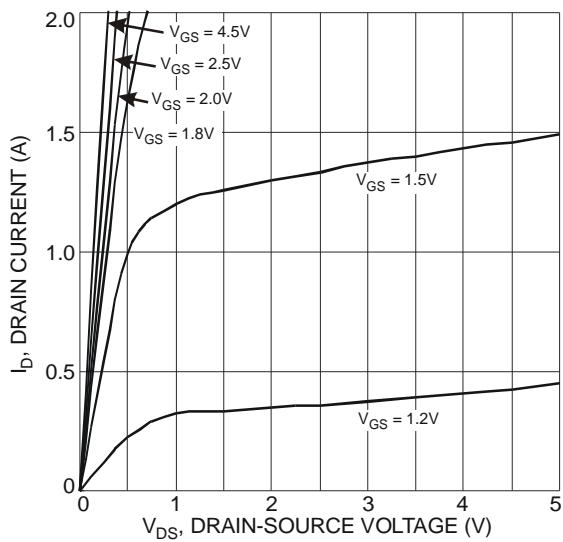
Fig. 3 Transient Thermal Resistance

 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	$\text{V}_{\text{GS}} = 0\text{V}$, $\text{I}_D = 10\mu\text{A}$
Zero Gate Voltage Drain Current $T_J = 25^\circ\text{C}$	I_{DSS}	-	-	1	μA	$\text{V}_{\text{DS}} = 20\text{V}$, $\text{V}_{\text{GS}} = 0\text{V}$
Gate-Source Leakage	I_{GSS}	-	-	10	μA	$\text{V}_{\text{GS}} = \pm 8\text{V}$, $\text{V}_{\text{DS}} = 0\text{V}$
ON CHARACTERISTICS (Note 7)						
Gate Threshold Voltage	$\text{V}_{\text{GS(th)}}$	0.45	-	0.95	V	$\text{V}_{\text{DS}} = \text{V}_{\text{GS}}$, $\text{I}_D = 250\mu\text{A}$
Static Drain-Source On-Resistance	$\text{R}_{\text{DS}}(\text{ON})$	-		175	$\text{m}\Omega$	$\text{V}_{\text{GS}} = 4.5\text{V}$, $\text{I}_D = 300\text{mA}$
				240		$\text{V}_{\text{GS}} = 2.5\text{V}$, $\text{I}_D = 250\text{mA}$
				360		$\text{V}_{\text{GS}} = 1.8\text{V}$, $\text{I}_D = 100\text{mA}$
Forward Transfer Admittance	$ \text{Y}_{\text{fs}} $	40	-	-	mS	$\text{V}_{\text{DS}} = 3\text{V}$, $\text{I}_D = 30\text{mA}$
Diode Forward Voltage	V_{SD}	-	0.7	1.2	V	$\text{V}_{\text{GS}} = 0\text{V}$, $\text{I}_S = 300\text{mA}$
DYNAMIC CHARACTERISTICS (Note 7)						
Input Capacitance	C_{iss}	-	64.3	-	pF	$\text{V}_{\text{DS}} = 25\text{V}$, $\text{V}_{\text{GS}} = 0\text{V}$, $f = 1.0\text{MHz}$
Output Capacitance	C_{oss}	-	6.1	-	pF	
Reverse Transfer Capacitance	C_{rss}	-	4.5	-	pF	
Gate Resistance	R_{g}	-	70	-	Ω	$\text{V}_{\text{DS}} = 0\text{V}$, $\text{V}_{\text{GS}} = 0\text{V}$, $f = 1\text{MHz}$
Total Gate Charge	Q_{g}	-	1.6	-	nC	$\text{V}_{\text{GS}} = 4.5\text{V}$, $\text{V}_{\text{DS}} = 15\text{V}$, $\text{I}_D = 1\text{A}$
Gate-Source Charge	Q_{gs}	-	0.2	-	nC	
Gate-Drain Charge	Q_{gd}	-	0.2	-	nC	
Turn-On Delay Time	$\text{t}_{\text{D(on)}}$	-	3.5	-	ns	$\text{V}_{\text{DS}} = 10\text{V}$, $\text{I}_D = 1\text{A}$ $\text{V}_{\text{GS}} = 10\text{V}$, $\text{R}_G = 6\Omega$
Turn-On Rise Time	t_r	-	2.8	-	ns	
Turn-Off Delay Time	$\text{t}_{\text{D(off)}}$	-	38	-	ns	
Turn-Off Fall Time	t_f	-	13	-	ns	

Notes: 7. Short duration pulse test used to minimize self-heating effect.

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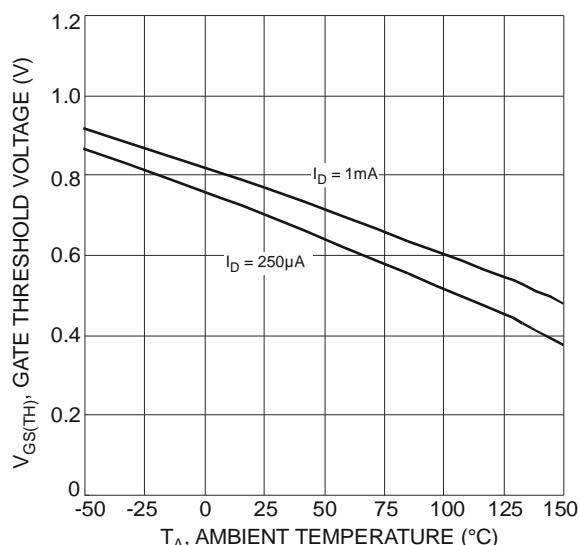


Fig. 10 Gate Threshold Variation vs. Ambient Temperature

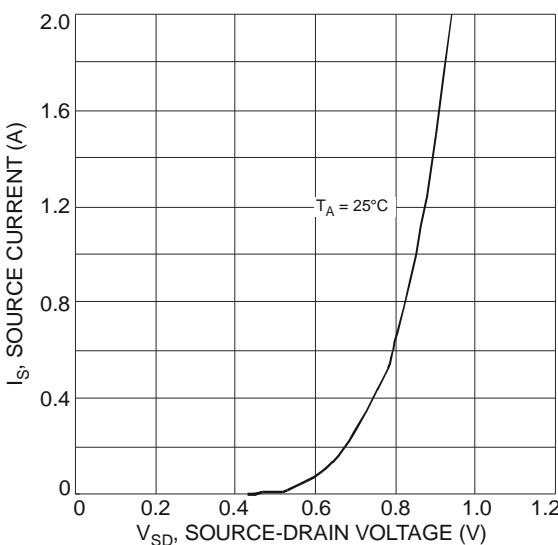


Fig. 11 Diode Forward Voltage vs. Current

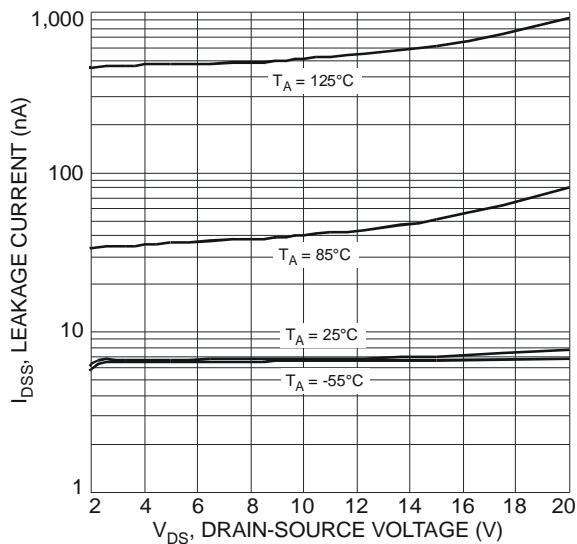


Fig. 12 Typical Leakage Current
vs. Drain-Source Voltage

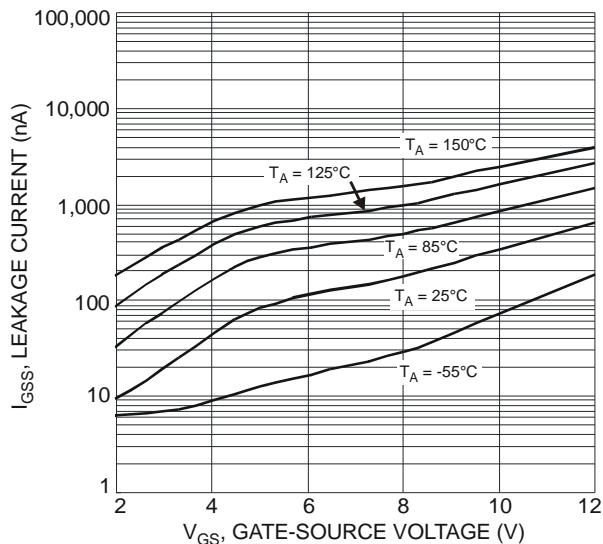


Fig. 13 Leakage Current vs. Gate-Source Voltage

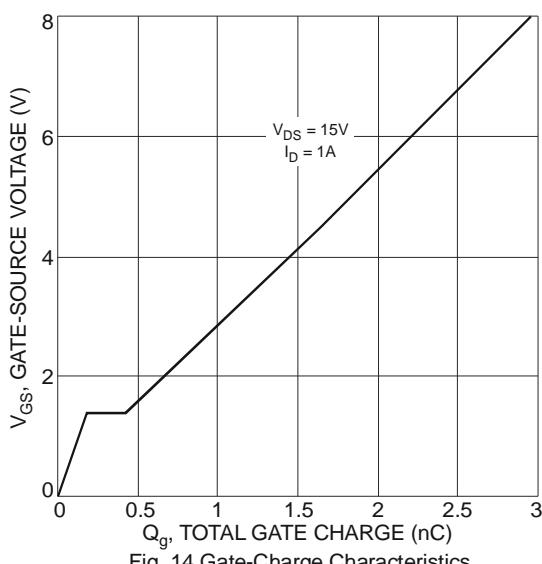
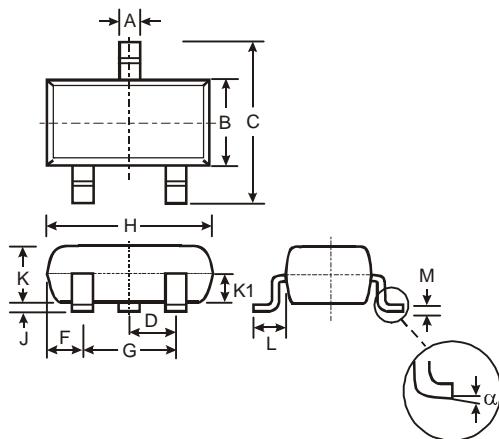


Fig. 14 Gate-Charge Characteristics

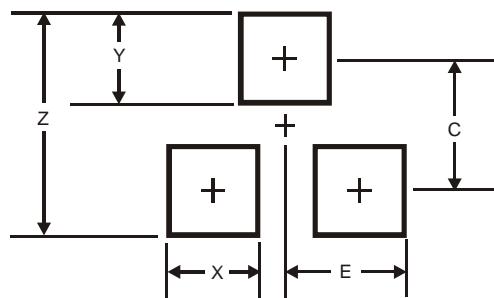
Package Outline Dimensions



SOT23			
Dim	Min	Max	Typ
A	0.37	0.51	0.40
B	1.20	1.40	1.30
C	2.30	2.50	2.40
D	0.89	1.03	0.915
F	0.45	0.60	0.535
G	1.78	2.05	1.83
H	2.80	3.00	2.90
J	0.013	0.10	0.05
K	0.903	1.10	1.00
K1	-	-	0.400
L	0.45	0.61	0.55
M	0.085	0.18	0.11
α	0°	8°	-

All Dimensions in mm

Suggested Pad Layout



Dimensions	Value (in mm)
Z	2.9
X	0.8
Y	0.9
C	2.0
E	1.35

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