

**N-Channel Enhancement Mode Field Effect Transistor**

**MAIN CHARACTERISTICS**

$V_{(BR)DSS}$	$R_{DS(ON)MAX}$	$I_D$
20V	22mΩ@4.5V	6.5A
	26mΩ@2.5V	
	34mΩ@1.8V	

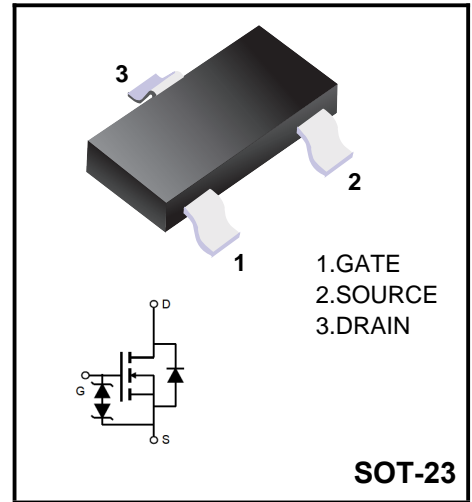
**Features**

- ◆High dense cell design for extremely low RDS(on).
- ◆Exceptional on-resistance and maximum DC current capability.
- ◆Load/Power Switching.
- ◆Interfacing Switching.

**Mechanical Data**

- ◆SOT-23 Small Outline Plastic Package.
- ◆Epoxy UL: 94V-0.
- ◆Mounting Position: Any.

**MARKING: 3416**



**Maximum Ratings & Thermal Characteristics**

Ratings at 25°C ambient temperature unless otherwise specified.

Parameters	Symbol	Value	Unit
Drain-Source Voltage	$V_{DS}$	20	V
Gate-Source Voltage	$V_{GS}$	±8	V
Continuous Drain Current	$I_D$	6.5	A
Drain Current-Pulsed(note 1)	$I_{DM}$	30	
Pulsed Drain Current	$P_D$	1.4	W
Junction Temperature	$T_j$	-55-+150	°C
Storage Temperature	$T_{stg}$	-55-+150	°C
Thermal Resistance From Junction to Ambient $t \leq 10s$	$R_{\theta JA}$	70-90	°C/W
Thermal Resistance From Junction to Ambient $t_{Steady-State}$		100-125	°C/W
Maximum Junction-to-Lead $t_{Steady-State}$	$R_{\theta JL}$	63-80	°C/W

**Electrical Characteristics**

Ratings at 25°C ambient temperature unless otherwise specified

Parameter	Symbols	Test Condition	Limits			Unit
			Min	Typ	Max	
<b>STATIC PARAMETERS</b>						
Drain-Source Breakdown Voltage	<b>V(BR)DSS</b>	VGS=0V, ID=250uA	20			V
Zero Gate Voltage Drain current	<b>IDSS</b>	VDS=20V, VGS=0V			1	uA
Gate-body Leakage	<b>IGSS</b>	VDS=±8V, VGS=0V			±10	uA
On state drain current	<b>ID(ON)</b>	VGS=4.5V, VDS=5V	30			A
Static Drain-Source On-Resistance	<b>RDS(ON)</b>	VGS=4.5V, ID=6.5A		16	22	mΩ
		VGS=2.5V, ID=5.5A		18	26	
		VGS=1.8V, ID=5A		21	34	
Forward trans conductance	<b>gfs</b>	VDS=5V, ID=6.5A		50		S
Gate-Threshold voltage*	<b>VGS (th)</b>	VDS=VGS, ID=250uA	0.4	0.7	1.1	V
Diode Forward Voltage	<b>VSD</b>	IS=1A, VGS=0V		0.62	1	V
Maximum Body-Diode Continuous Current	<b>IS</b>				2	A
<b>DYNAMIC PARAMETERS</b>						
Input capacitance	<b>Ciss</b>	VDS=10V, VGS=0V, f=1MHz		1295	1650	pF
Output capacitance	<b>Coss</b>			160		
Reverse Transfer capacitance	<b>Crss</b>			8587		
Gate resistance	<b>Rg</b>	VDS=0V, VGS=0V, f=1MHz		1.8		Ω
<b>SWITCHING PARAMETERS</b>						
Turn-on Time	<b>td(on)</b>	VGS=4.5V, RL=1.54Ω, VDS=10V, RGEN=3Ω		280		nS
Rise time	<b>tr</b>			328		
Turn-off Time	<b>td(off)</b>			3.76		
Fall time	<b>tf</b>			2.24		
Total Gate Charge	<b>Qg</b>	VGS=4.5V, VDS=10V, ID=6.5A		10		nC
Gate Source Charge	<b>Qgs</b>			4.2		
Gate Drain Charge	<b>Qgd</b>			2.6		
Body Diode Reverse Recovery Time	<b>trr</b>	IF=6.5A, dI/dt=100A/ms		31	41	nS
Body Diode Reverse Recovery Charge	<b>Qrr</b>	IF=6.5A, dI/dt=100A/ms		6.8		nC

- A. The value of RqJA is measured with the device mounted on 1in2 FR-4 board with 2oz. Copper, in a still air environment with TA =25°C. The value in any given application depends on the user's specific board design.
- B. The power dissipation PD is based on TJ(MAX)=150° C, using ≤ 10s junction-to-ambient thermal resistance.
- C. Repetitive rating, pulse width limited by junction temperature TJ(MAX)=150°C. Ratings are based on low frequency and duty cycles to keep initialTJ=25°C.
- D. The RqJA is the sum of the thermal impedance from junction to lead RqJL and lead to ambient.
- E. The static characteristics in Figures 1 to 6 are obtained using <300ms pulses, duty cycle 0.5% max.
- F. These curves are based on the junction-to-ambient thermal impedance which is measured with the device mounted on 1in2 FR-4 board with 2oz. Copper, assuming a maximum junction temperature of TJ(MAX)=150°C. The SOA curve provides a single pulse rating.

Typical characteristics

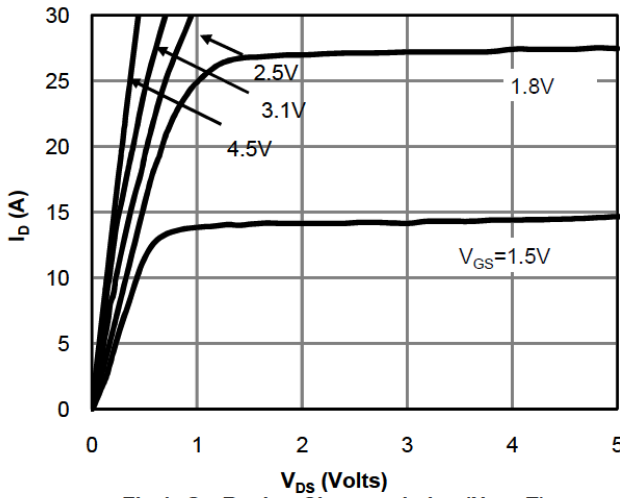


Fig 1: On-Region Characteristics (Note E)

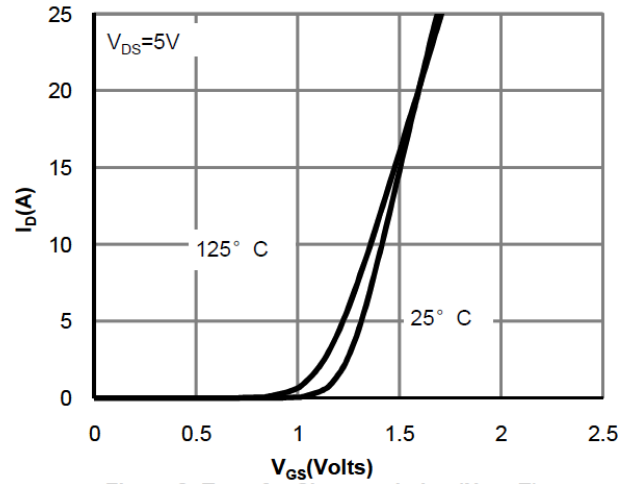


Figure 2: Transfer Characteristics (Note E)

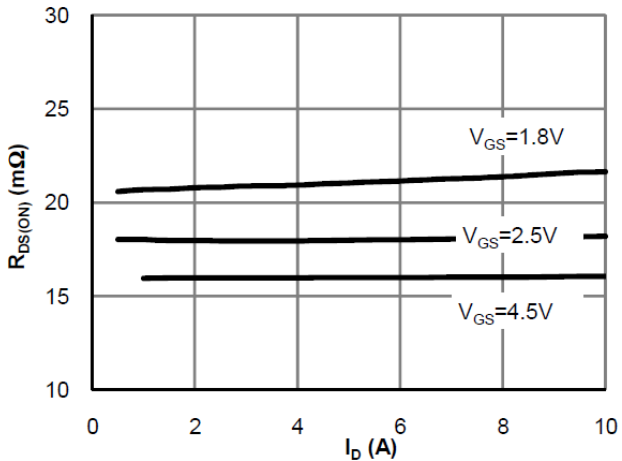


Figure 3: On-Resistance vs. Drain Current and Gate Voltage (Note E)

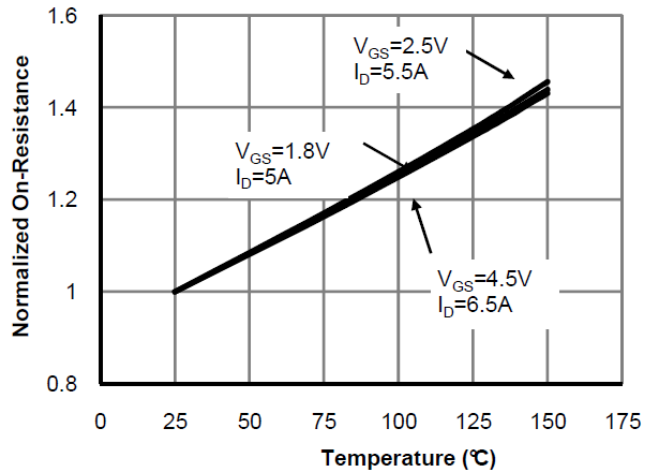


Figure 4: On-Resistance vs. Junction Temperature (Note E)

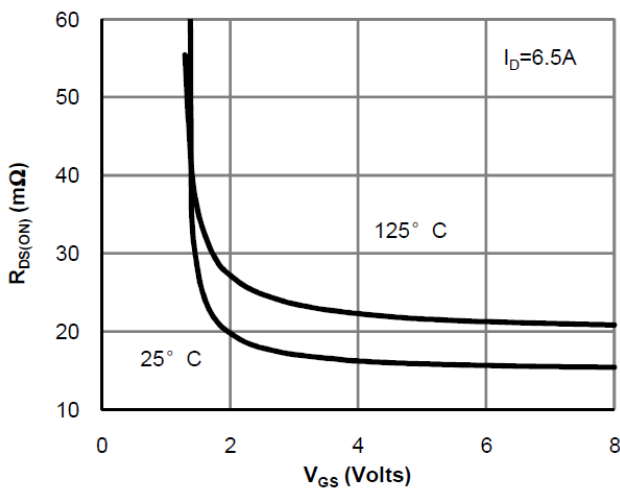


Figure 5: On-Resistance vs. Gate-Source Voltage (Note E)

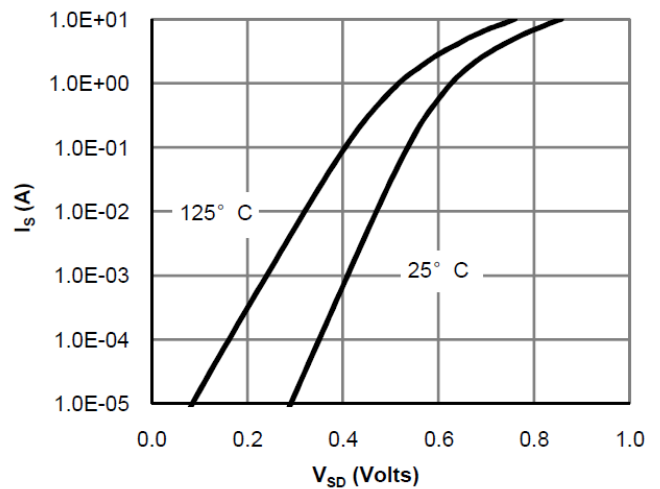


Figure 6: Body-Diode Characteristics (Note E)

Typical characteristics

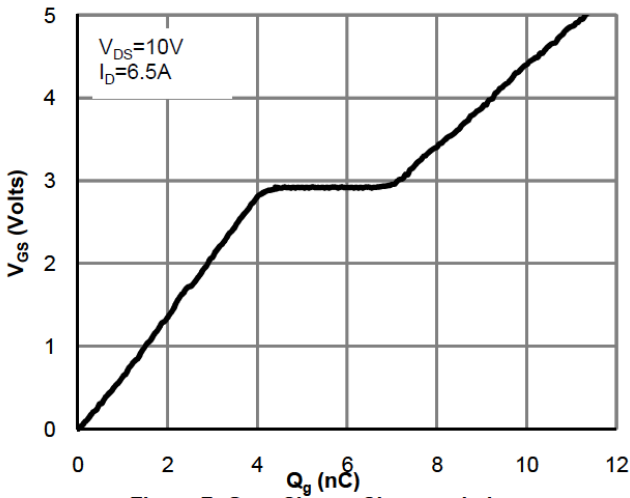


Figure 7: Gate-Charge Characteristics

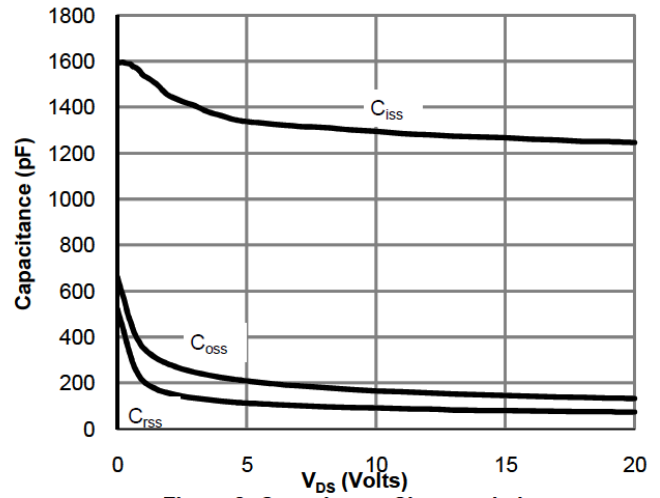


Figure 8: Capacitance Characteristics

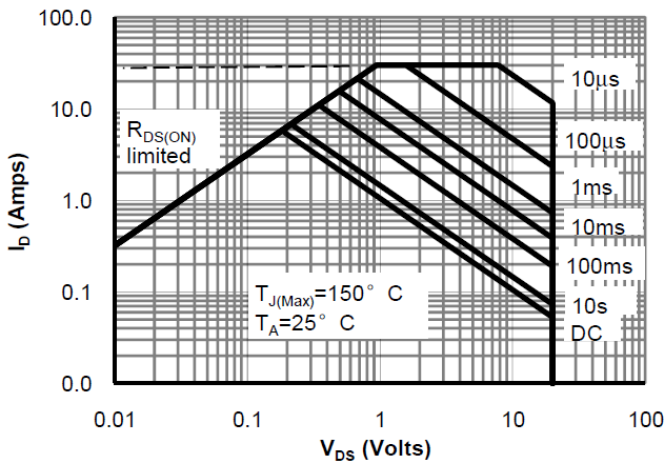


Figure 9: Maximum Forward Biased Safe Operating Area (Note F)

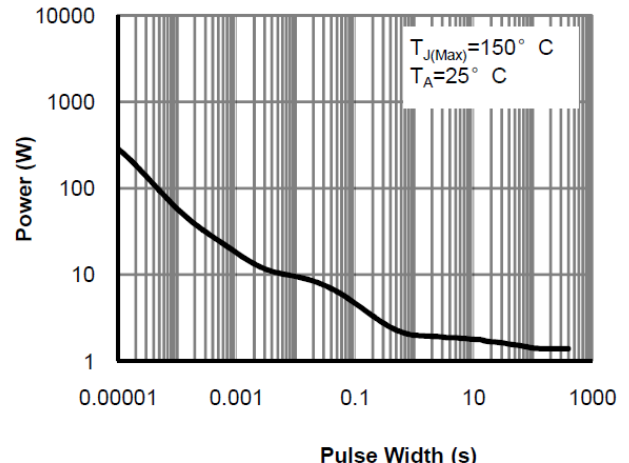


Figure 10: Single Pulse Power Rating Junction-to-Ambient (Note F)

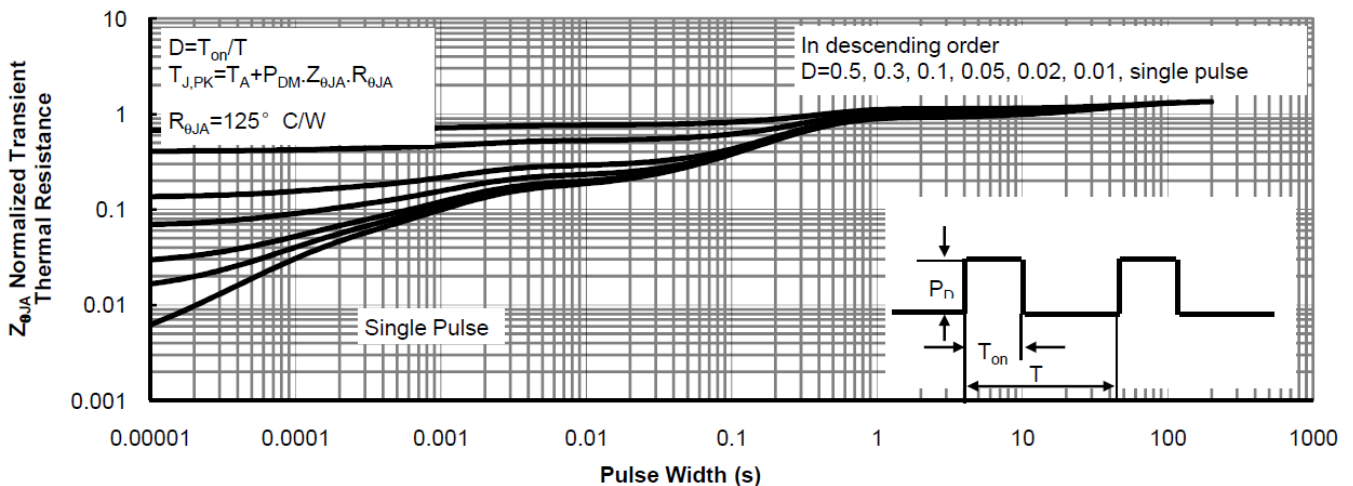
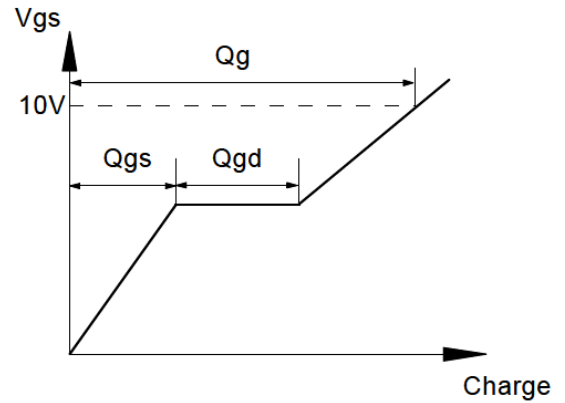
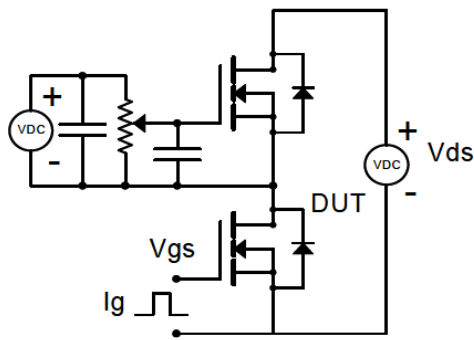
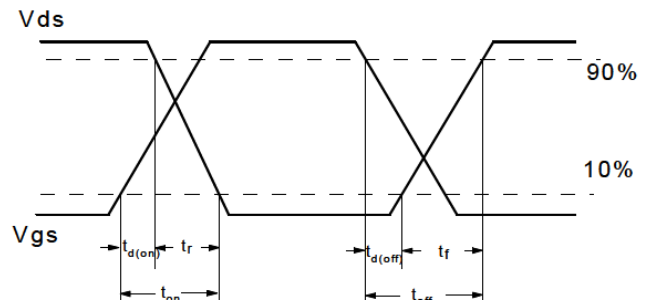
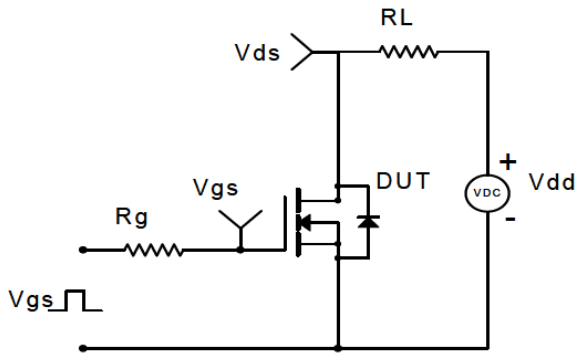


Figure 11: Normalized Maximum Transient Thermal Impedance (Note F)

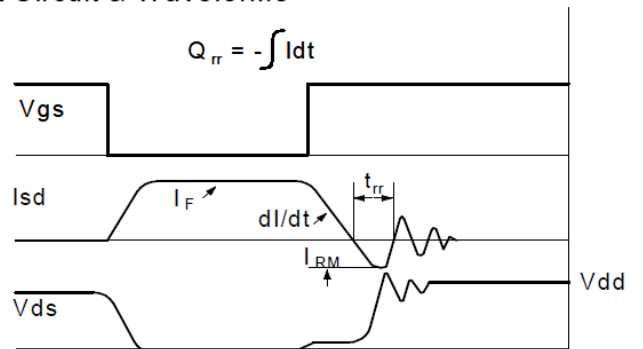
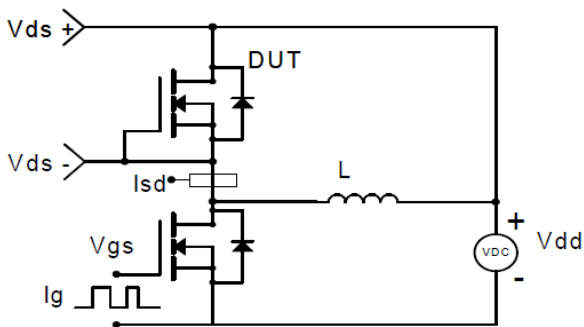
**Gate Charge Test Circuit & Waveform**



**Resistive Switching Test Circuit & Waveforms**

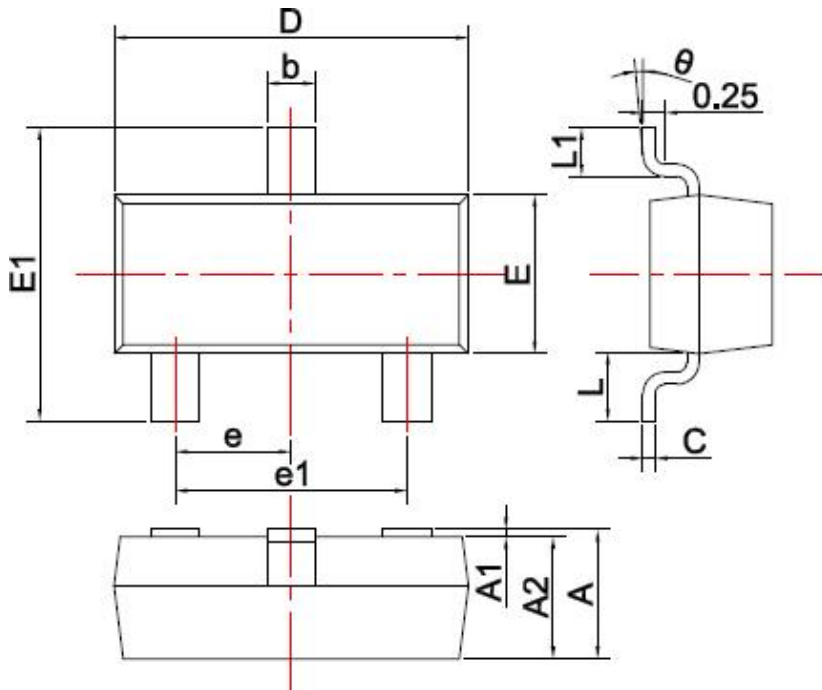


**Diode Recovery Test Circuit & Waveforms**



**Package Outline SOT-23**

Plastic surface mounted package



SYMBOL	DIMENSIONS	
	MIN.	MAX.
A	0.900	1.150
A1	0.000	0.100
A2	0.900	1.050
b	0.300	0.500
c	0.080	0.150
D	2.800	3.000
E	1.200	1.400
E1	2.250	2.550
e	0.950TYP	
e1	1.800	2.000
L	0.550REF	
L1	0.300	0.500
θ	0°	8°

Unit: mm

**Summary of Packing Options**

Package	Packing Description	Packing Quantity	Industry Standard
SOT-23	Tape/Reel,7"reel	3000	EIA-481-1

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