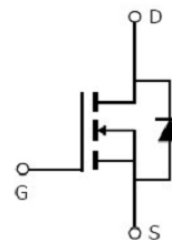


Main Product Characteristics:

V_{DSS}	150V
$R_{DS(on)}$	0.14Ω(typ)
I_D	6A


SOT223

Marking and pin Assignment

Schematic diagram
Features and Benefits:

- Advanced trench MOSFET process technology
- Special designed for PWM, load switching and general purpose applications
- Ultra low on-resistance with low gate charge
- Fast switching and reverse body recovery
- 175°C operating temperature


Description:

It utilizes the latest trench processing techniques to achieve the high cell density and reduces the on-resistance with high repetitive avalanche rating. These features combine to make this design an extremely efficient and reliable device for use in power switching application and a wide variety of other applications

Absolute max Rating:

Symbol	Parameter	Max.	Units
$I_D @ TC = 25^\circ C$	Continuous Drain Current, $V_{GS} @ 10V$	6 ①	A
$I_D @ TC = 100^\circ C$	Continuous Drain Current, $V_{GS} @ 10V$	4.2 ①	
I_{DM}	Pulsed Drain Current ②	24	
$P_D @ TC = 25^\circ C$	Power Dissipation ③	12	W
	Linear Derating Factor	0.08	W/°C
V_{DS}	Drain-Source Voltage	150	V
V_{GS}	Gate-to-Source Voltage	± 20	V
$T_J \quad T_{STG}$	Operating Junction and Storage Temperature Range	-55 to + 175	°C

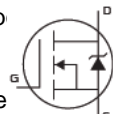
Thermal Resistance

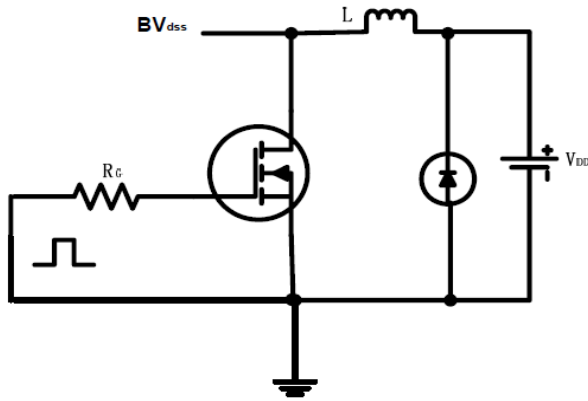
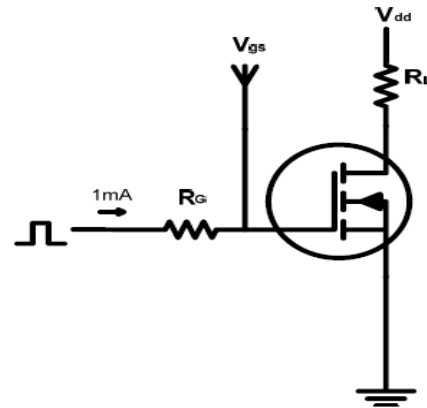
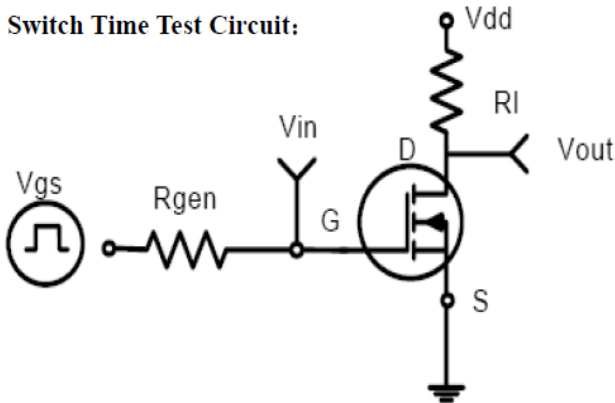
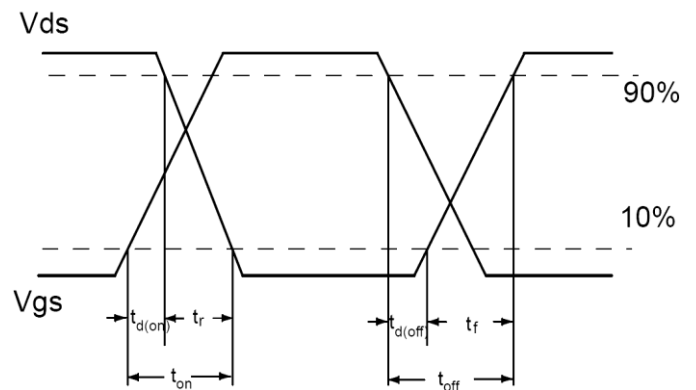
Symbol	Characterizes	Typ.	Max.	Units
$R_{\theta JC}$	Junction-to-case ③	—	13	$^{\circ}C/W$
$R_{\theta JA}$	Junction-to-Ambient ($t \leq 10s$)④	—	62	$^{\circ}C/W$
	Junction-to-Ambient (PCB mounted, steady-state) ④	—	40	$^{\circ}C/W$

Electrical Characterizes @ $T_A=25^{\circ}C$ unless otherwise specified

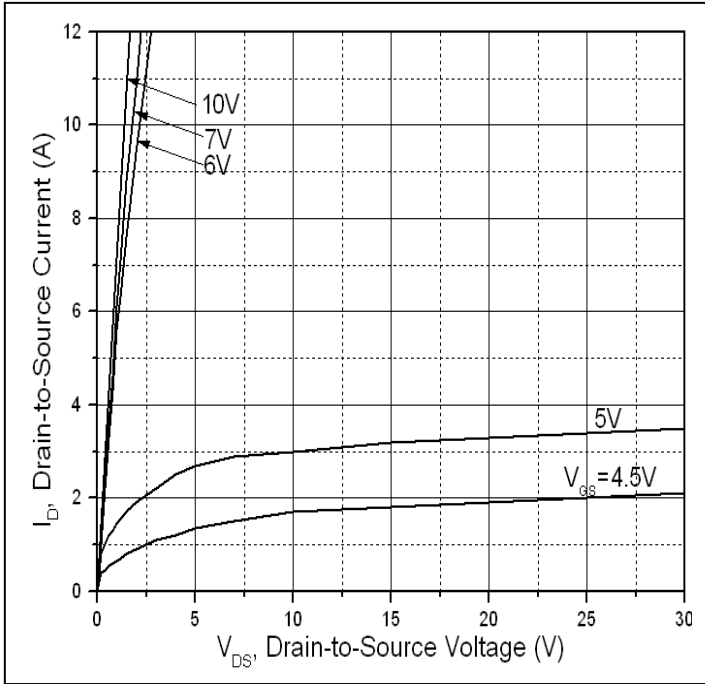
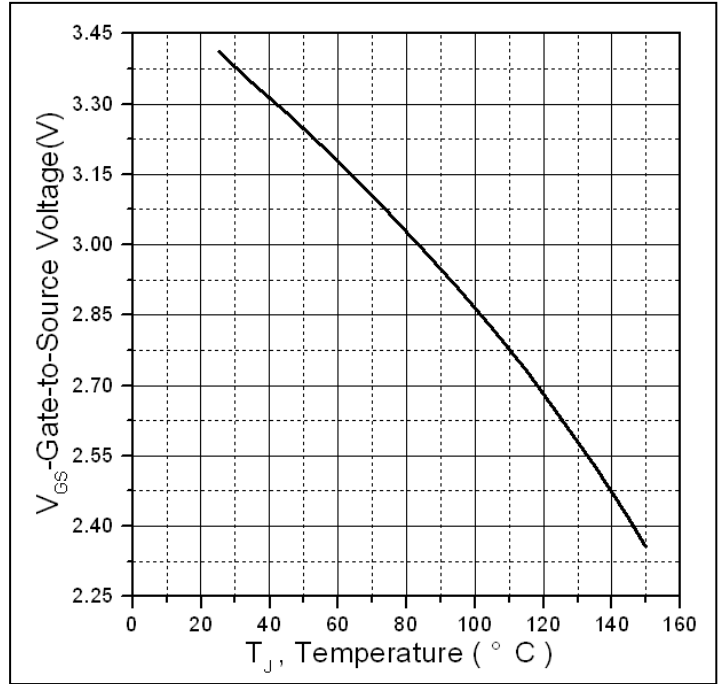
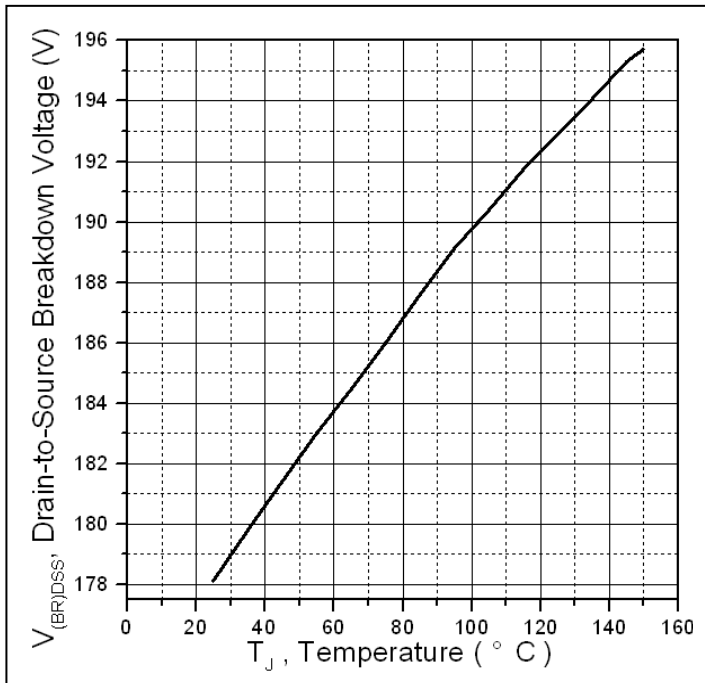
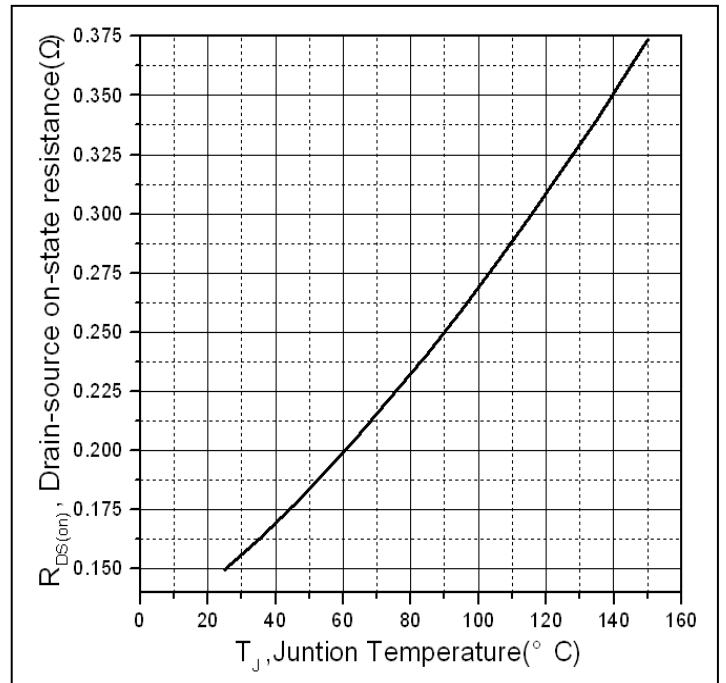
Symbol	Parameter	Min.	Typ.	Max.	Units	Conditions
$V_{(BR)DSS}$	Drain-to-Source breakdown voltage	150	—	—	V	$V_{GS} = 0V, I_D = 250\mu A$
$R_{DS(on)}$	Static Drain-to-Source on-resistance	—	0.14	0.2	Ω	$V_{GS}=10V, I_D = 2.8A$
		—	0.32	—		$T_J = 125^{\circ}C$
$V_{GS(th)}$	Gate threshold voltage	2	—	4	V	$V_{DS} = V_{GS}, I_D = 250\mu A$
		—	2.63	—		$T_J = 125^{\circ}C$
I_{DSS}	Drain-to-Source leakage current	—	—	1	μA	$V_{DS} = 120V, V_{GS} = 0V$
		—	—	50		$T_J = 125^{\circ}C$
I_{GSS}	Gate-to-Source forward leakage	—	—	100	nA	$V_{GS} = 20V$
	Gate-to-Source reverse leakage	-100	—	—		$V_{GS} = -20V$
Q_g	Total gate charge	—	30.9	—	nC	$I_D = 2.8A$
Q_{gs}	Gate-to-Source charge	—	6.5	—		$V_{DD} = 75V$
Q_{gd}	Gate-to-Drain("Miller") charge	—	10.6	—		$V_{GS} = 10V$
$t_{d(on)}$	Turn-on delay time	—	11.8	—	nS	$V_{GS} = 10V, V_{DS} = 75V,$
t_r	Rise time	—	5.7	—		$R_L = 26\Omega,$
$t_{d(off)}$	Turn-Off delay time	—	29.3	—		$R_{GEN} = 6\Omega$
t_f	Fall time	—	6.0	—		$I_D = 2.8A$
C_{iss}	Input capacitance	—	1230	—	pF	$V_{GS} = 0V$
C_{oss}	Output capacitance	—	47	—		$V_{DS} = 75V$
C_{riss}	Reverse transfer capacitance	—	31	—		$f = 1MHz$

Source-Drain Ratings and Characteristics

Symbol	Parameter	Min.	Typ.	Max.	Units	Conditions
I_S	Continuous Source Current (Body Diode)	—	—	6	A	MOSFET symb showing the integral reverse p-n junction diode. 
I_{SM}	Pulsed Source Current (Body Diode)	—	—	24	A	
V_{SD}	Diode Forward Voltage	—	0.81	1.5	V	$I_S = 2.8A, V_{GS} = 0V, T_J = 25^{\circ}C$
t_{rr}	Reverse Recovery Time	—	54.8	—	nS	$T_J = 25^{\circ}C, I_F = 2.8A, di/dt =$
Q_{rr}	Reverse Recovery Charge	—	133.9	—	nC	$100A/\mu s$

Test circuits and Waveforms
EAS test circuits:

Gate charge test circuit:

Switch Time Test Circuit:

Switch Waveforms:

Notes:

- ① Calculated continuous current based on maximum allowable junction temperature. Package limitation current is 75A.
- ② Repetitive rating; pulse width limited by max. junction temperature.
- ③ The power dissipation PD is based on max. junction temperature, using junction-to-case thermal resistance.
- ④ The value of $R_{\theta JA}$ is measured with the device mounted on 1 in 2 FR-4 board with 2oz. Copper, in a still air environment with $T_A = 25^\circ\text{C}$
- ⑤ These curves are based on the junction-to-case thermal impedance which is measured with the device mounted to a large heatsink, assuming a maximum junction temperature of $T_{J(\text{MAX})} = 175^\circ\text{C}$.

Typical electrical and thermal characteristics

Figure 1: Typical Output Characteristics

Figure 2. Gate to source cut-off voltage

Figure 3. Drain-to-Source Breakdown Voltage vs. Temperature

Figure 4: Normalized On-Resistance Vs. Case Temperature

Typical electrical and thermal characteristics

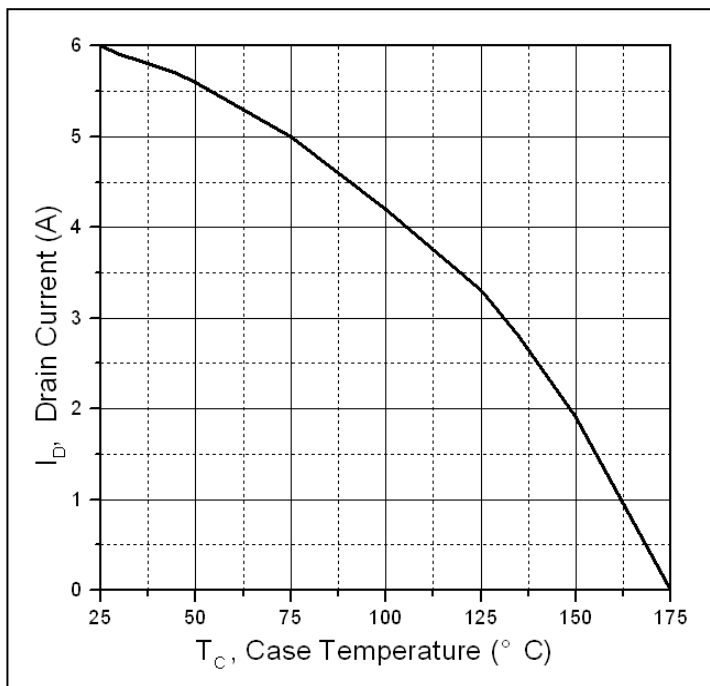


Figure 5. Maximum Drain Current Vs. Case Temperature

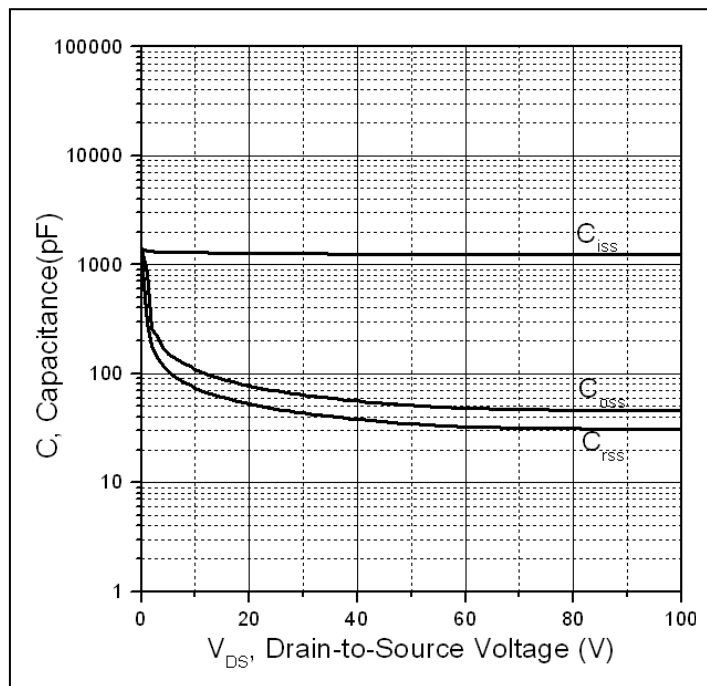


Figure 6. Typical Capacitance Vs. Drain-to-Source Voltage

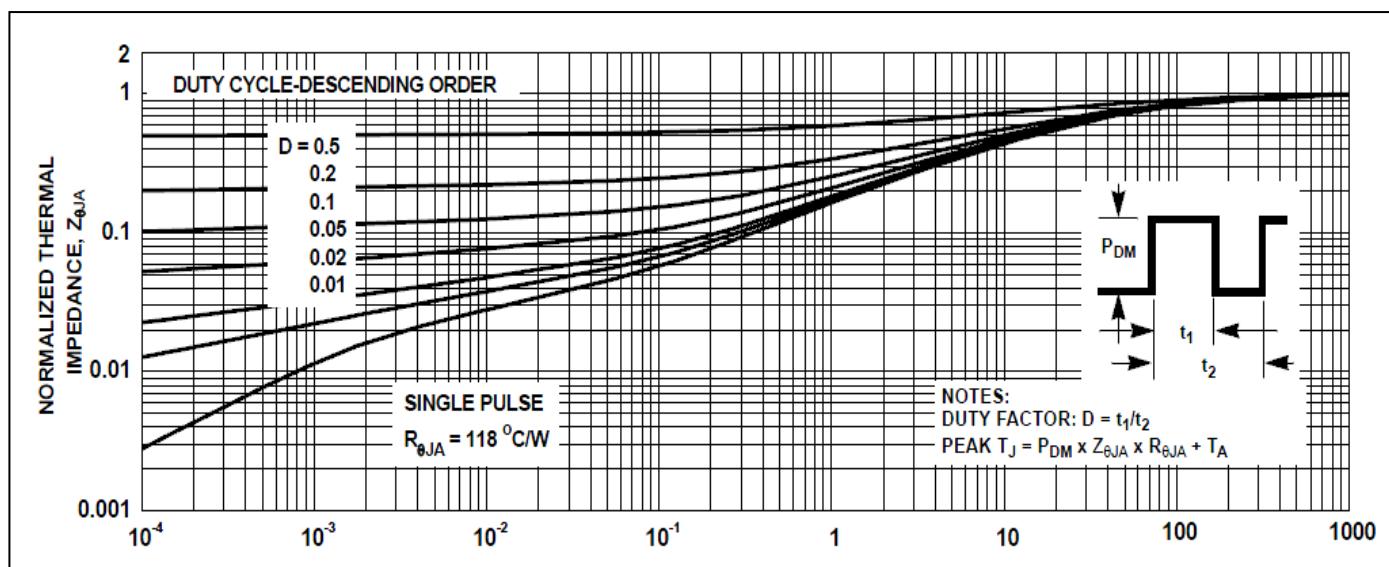
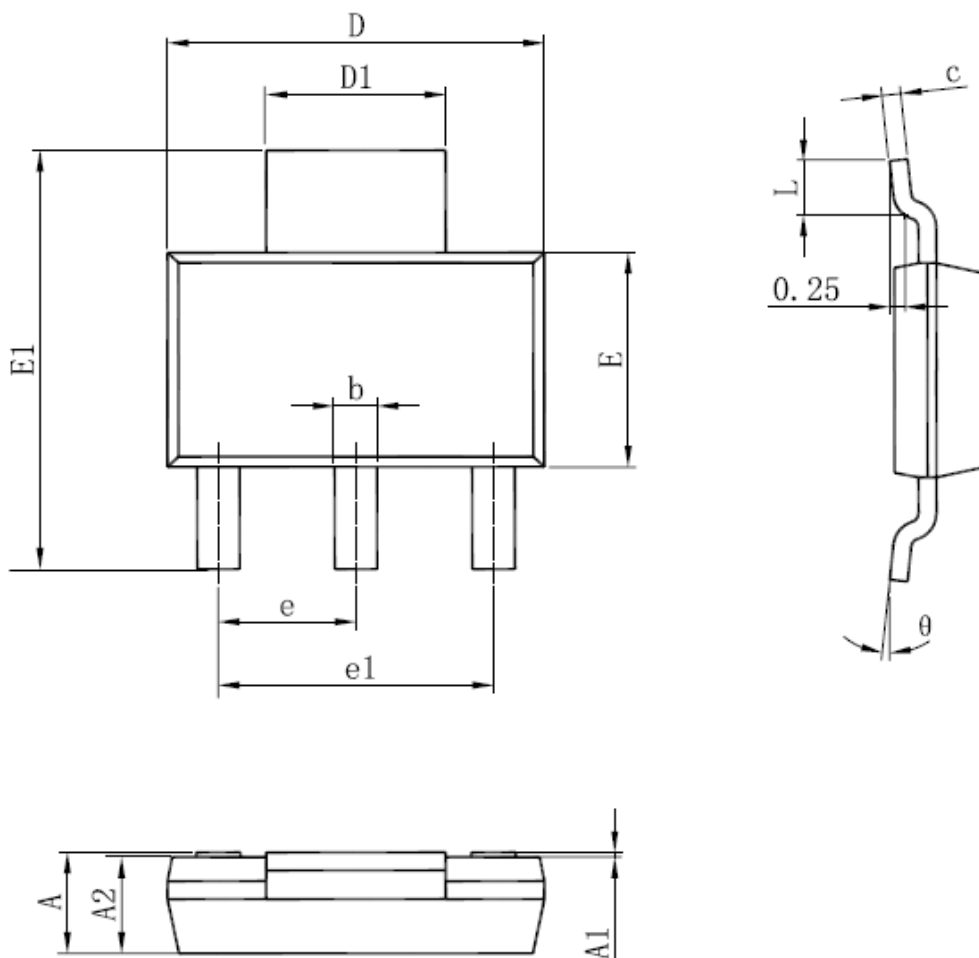


Figure 7. Maximum Effective Transient Thermal Impedance, Junction-to-Case

Mechanical Data:
SOT223 PACKAGE OUTLINE DIMENSION:


Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	1.520	1.800	0.060	0.071
A1	0.000	0.100	0.000	0.004
A2	1.500	1.700	0.059	0.067
b	0.660	0.820	0.026	0.032
c	0.250	0.350	0.010	0.014
D	6.200	6.400	0.244	0.252
D1	2.900	3.100	0.114	0.122
E	3.300	3.700	0.130	0.146
E1	6.830	7.070	0.269	0.278
e	2.300(BSC)		0.091(BSC)	
e1	4.500	4.700	0.177	0.185
L	0.900	1.150	0.035	0.045
θ	0°	10°	0°	10°

Ordering and Marking Information

Device Marking: 1502G5 Package (Available) SOT223 Operating Temperature Range C : -55 to 175 °C
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Devices per Unit

Package Type	Units/Tube	Tubes/Inner Box	Units/Inner Box	Inner Boxes/Carton Box	Units/Carton Box
SOT223	3000	10	30000	4	120000

Reliability Test Program

Test Item	Conditions	Duration	Sample Size
High Temperature Reverse Bias(HTRB)	$T_j=125^{\circ}\text{C}$ to 175°C @ 80% of Max $V_{DSS}/V_{CES}/V_R$	168 hours 500 hours 1000 hours	3 lots x 77 devices
High Temperature Gate Bias(HTGB)	$T_j=150^{\circ}\text{C}$ or 175°C @ 100% of Max V_{GSS}	168 hours 500 hours 1000 hours	3 lots x 77 devices

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