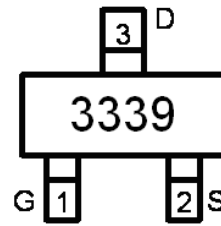


## Main Product Characteristics

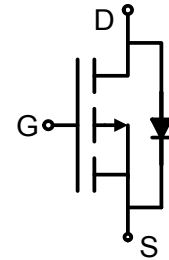
$V_{DSS}$	-30V
$R_{DS(on)}$	37m $\Omega$ (typ.)
$I_D$	-4.1A ①



SOT-23



Marking and Pin Assignment



Schematic Diagram

## Features and Benefits

- Advanced trench MOSFET process technology
- Ideal for PWM, load switching and general purpose applications
- Ultra low on-resistance with low gate charge
- Fast switching and reverse body recovery
- 150°C operating temperature
- Lead Free



## Description

The SSF3339 utilizes the latest processing techniques to achieve high cell density, low on-resistance and high repetitive avalanche rating. These features make this device extremely efficient and reliable for use in power switching applications and a wide variety of other applications.

## Absolute Max Ratings ( $T_A=25^\circ\text{C}$ unless otherwise specified)

Symbol	Parameter	Max.	Units
$I_D @ TC = 25^\circ\text{C}$	Continuous Drain Current, $V_{GS} @ 10\text{V}$	-4.1 ①	A
$I_D @ TC = 70^\circ\text{C}$	Continuous Drain Current, $V_{GS} @ 10\text{V}$	-3.5 ①	
$I_{DM}$	Pulsed Drain Current ②	-20	
$P_D @ TC = 25^\circ\text{C}$	Power Dissipation ③	1.4	W
$V_{DS}$	Drain-Source Voltage	-30	V
$V_{GS}$	Gate-to-Source Voltage	$\pm 20$	V
$T_J$ $T_{STG}$	Operating Junction and Storage Temperature Range	-55 to +150	$^\circ\text{C}$

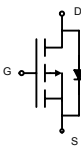
## Thermal Resistance

Symbol	Characteristics	Typ.	Max.	Units
$R_{\theta JA}$	Junction-to-ambient ( $t \leq 10\text{s}$ ) ④	—	90	$^\circ\text{C/W}$

**Electrical Characteristics** ( $T_A=25^\circ\text{C}$  unless otherwise specified)

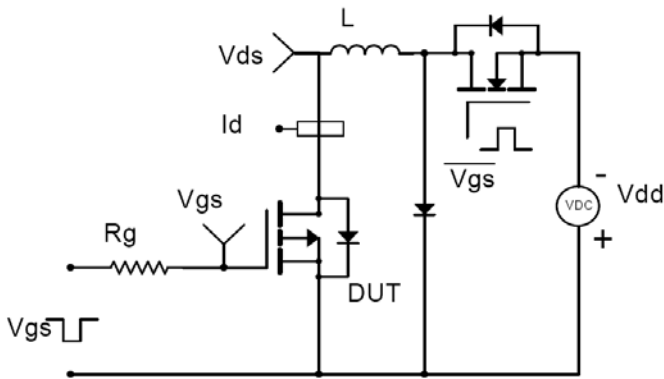
Symbol	Parameter	Min.	Typ.	Max.	Units	Conditions
$V_{(BR)DSS}$	Drain-to-Source Breakdown Voltage	-30	—	—	V	$V_{GS} = 0V, I_D = -250\mu A$
$R_{DS(on)}$	Static Drain-to-Source On-resistance	—	37	52	m $\Omega$	$V_{GS}=-10V, I_D = -4.1A$
		—	54	87		$V_{GS}=-4.5V, I_D = -3A$
$V_{GS(th)}$	Gate Threshold Voltage	-1	—	-3	V	$V_{DS} = V_{GS}, I_D = -250\mu A$
		—	-1.4	—		$T_J = 125^\circ\text{C}$
$I_{DSS}$	Drain-to-Source Leakage Current	—	—	-1	$\mu A$	$V_{DS} = -24V, V_{GS} = 0V$
		—	—	-50		$T_J = 125^\circ\text{C}$
$I_{GSS}$	Gate-to-Source Forward Leakage	—	—	100	nA	$V_{GS} = 20V$
		—	—	-100		$V_{GS} = -20V$
$Q_g$	Total Gate Charge	—	17	—	nC	$I_D = -6A,$ $V_{DS} = -25V,$ $V_{GS} = -10V$
$Q_{gs}$	Gate-to-Source Charge	—	2.5	—		
$Q_{gd}$	Gate-to-Drain("Miller") Charge	—	5.0	—		
$t_{d(on)}$	Turn-on Delay Time	—	7.2	—	ns	$V_{GS} = -10V, V_{DS} = -25V,$ $R_{GEN} = 3\Omega,$
$t_r$	Rise Time	—	4.8	—		
$t_{d(off)}$	Turn-Off Delay Time	—	24	—		
$t_f$	Fall Time	—	11	—		
$C_{iss}$	Input Capacitance	—	665	—	pF	$V_{GS} = 0V,$ $V_{DS} = -15V,$ $f = 1\text{MHz}$
$C_{oss}$	Output Capacitance	—	108	—		
$C_{rss}$	Reverse Transfer Capacitance	—	83	—		

**Source-Drain Ratings and Characteristics**

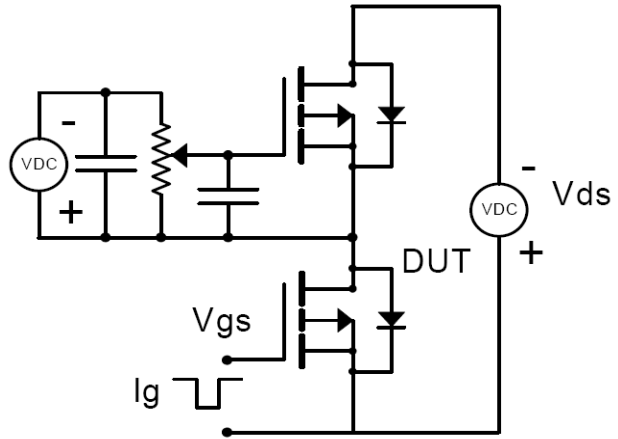
Symbol	Parameter	Min.	Typ.	Max.	Units	Conditions
$I_S$	Continuous Source Current (Body Diode)	—	—	-4.1 ①	A	MOSFET symbol showing the integral reverse p-n junction diode. 
$I_{SM}$	Pulsed Source Current (Body Diode)	—	—	-20	A	
$V_{SD}$	Diode Forward Voltage	—	-0.79	-1.0	V	$I_S = 1A, V_{GS} = 0V$
$t_{rr}$	Reverse Recovery Time	—	9.7	—	ns	$T_J = 25^\circ\text{C}, I_F = -6A,$
$Q_{rr}$	Reverse Recovery Charge	—	3.8	—	nC	$di/dt = 100A/\mu s$

**Test Circuits and Waveforms**

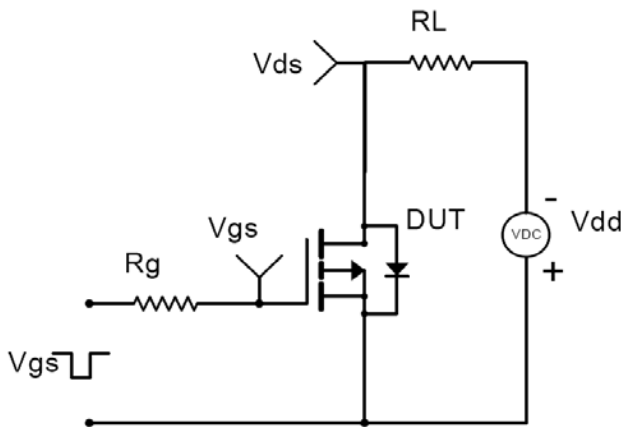
**E<sub>AS</sub> Test Circuit:**



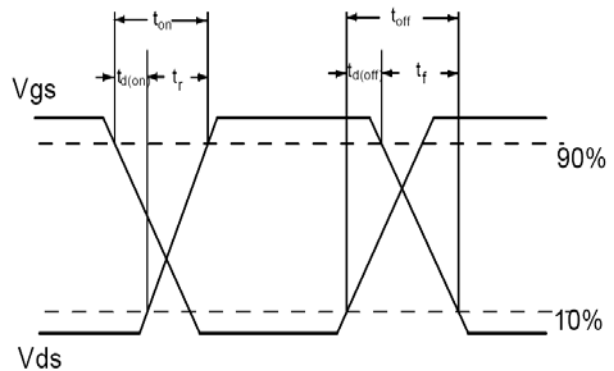
**Gate Charge Test Circuit:**



**Switching Time Test Circuit:**



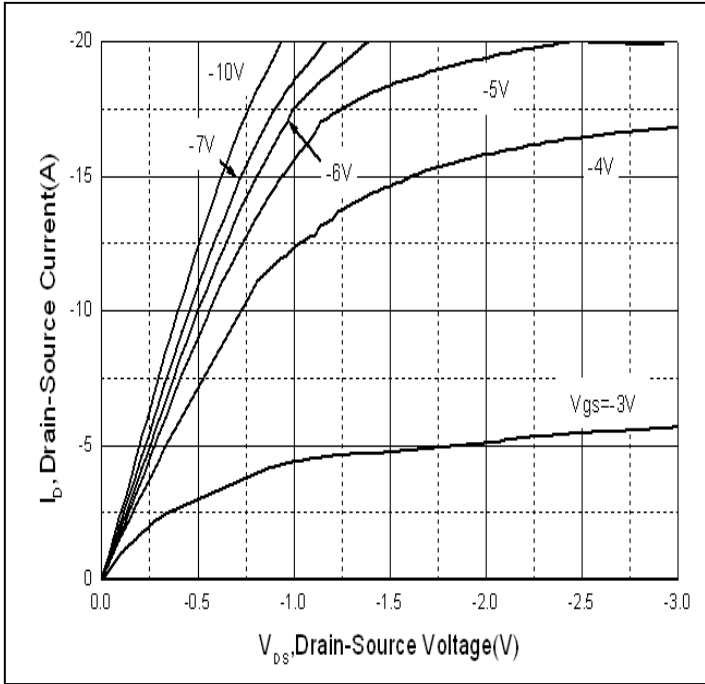
**Switch Waveforms:**



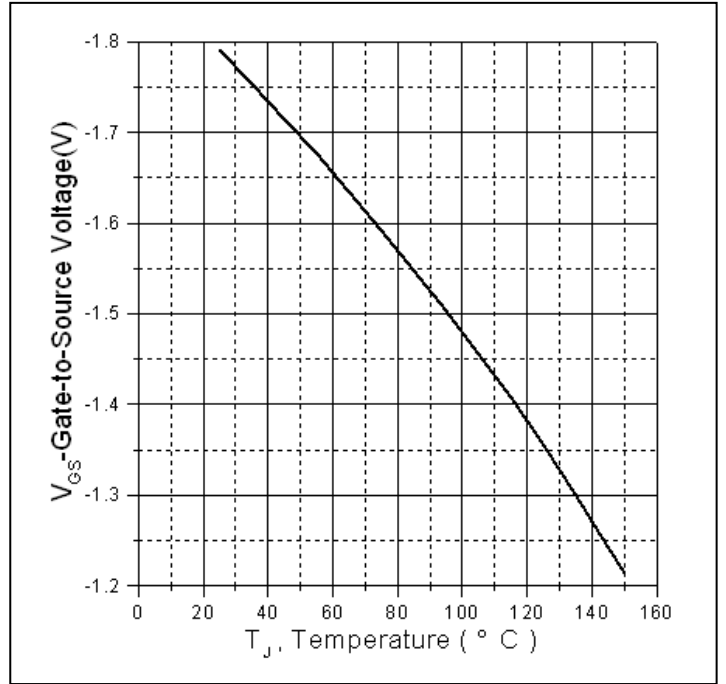
**Notes:**

- ① Calculated continuous current based on maximum allowable junction temperature.
- ② Repetitive rating; pulse width limited by max. junction temperature.
- ③ The power dissipation P<sub>D</sub> is based on max. junction temperature, using junction-to-case thermal resistance.
- ④ The value of R<sub>θJA</sub> is measured with the device mounted on 1 in<sup>2</sup> FR-4 board with 2oz. Copper, in a still air environment with T<sub>A</sub> = 25°C

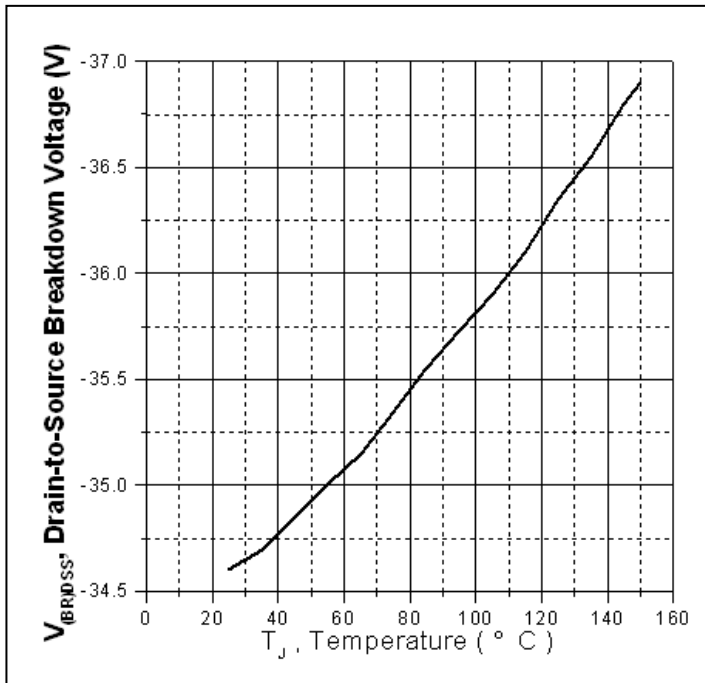
**Typical Electrical and Thermal Characteristics**



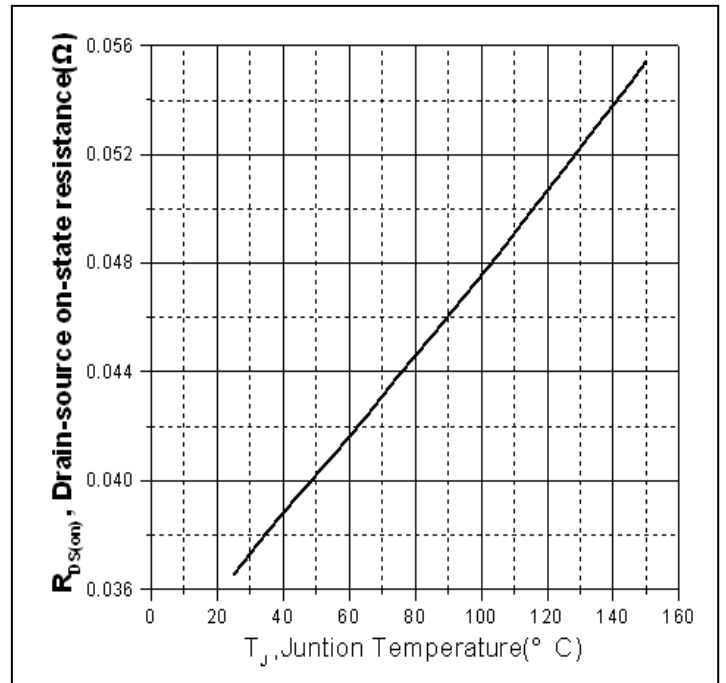
**Figure 1. Typical Output Characteristics**



**Figure 2. Gate to Source Cut-off Voltage**

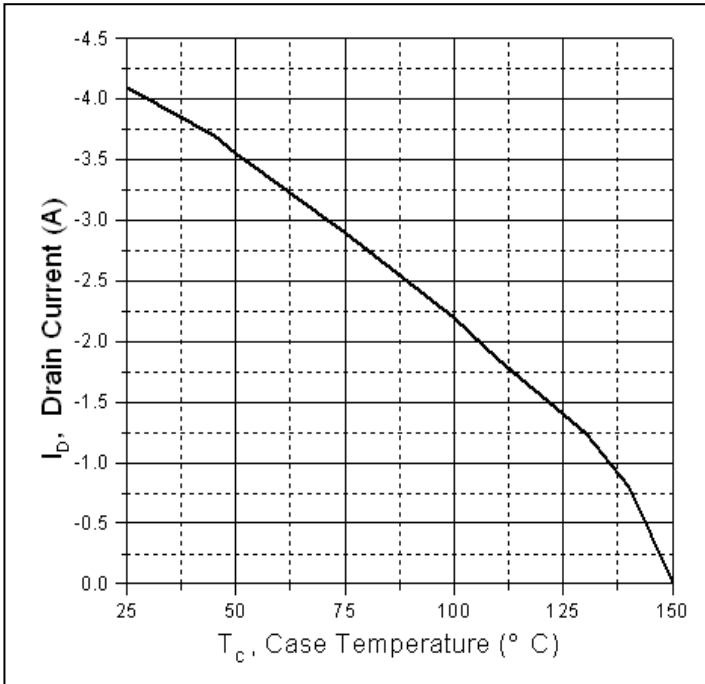


**Figure 3. Drain-to-Source Breakdown Voltage Vs. Case Temperature**

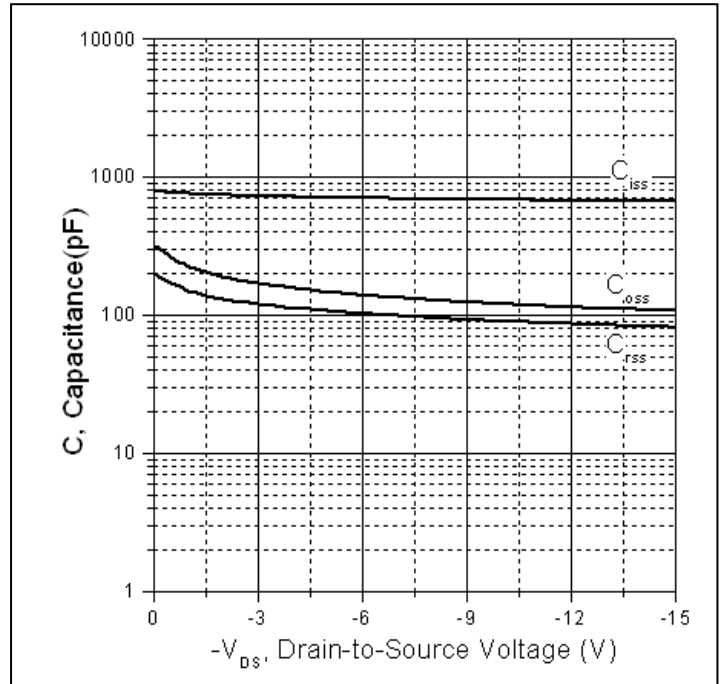


**Figure 4. Normalized On-Resistance Vs. Case Temperature**

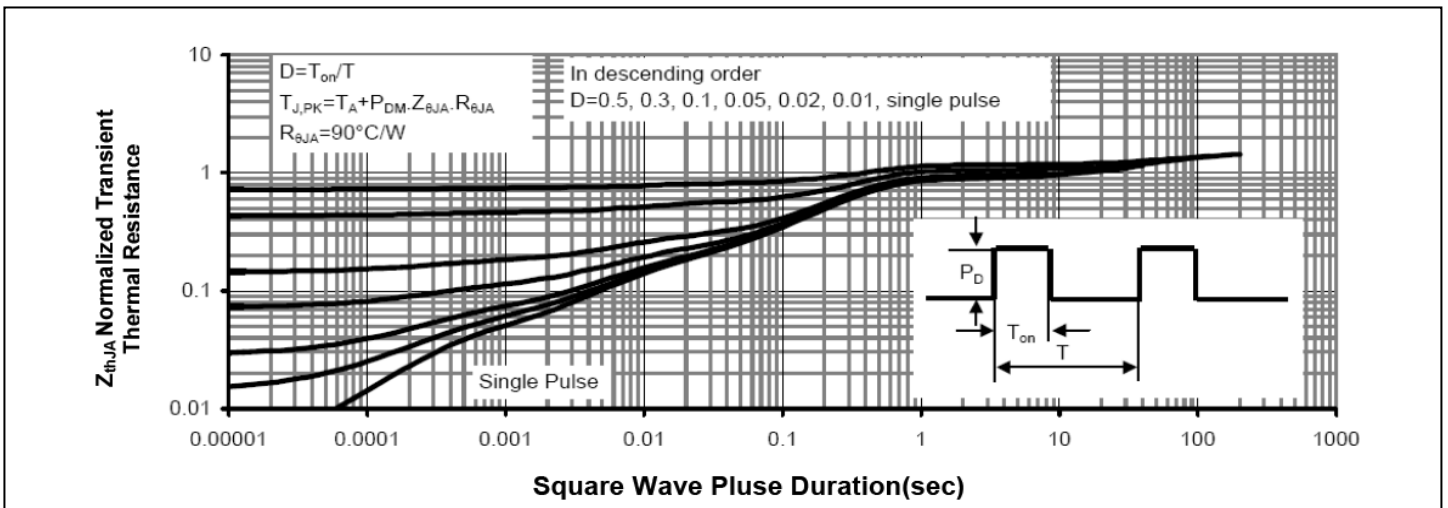
**Typical Electrical and Thermal Characteristics**



**Figure 5. Maximum Drain Current Vs. Case Temperature**



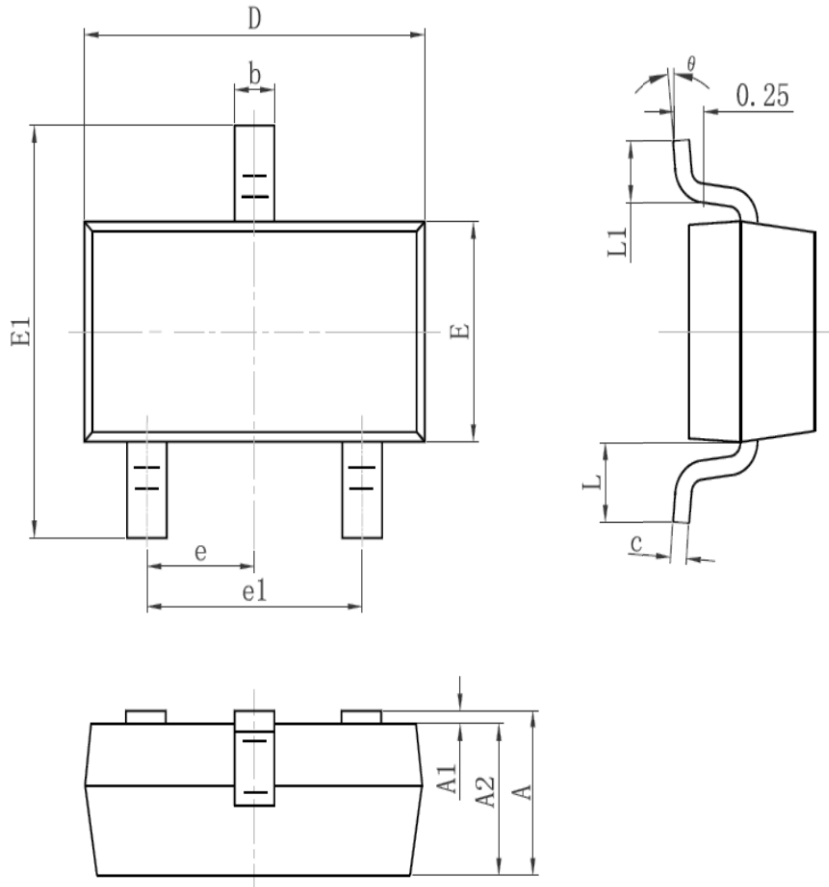
**Figure 6. Typical Capacitance Vs. Drain-to-Source Voltage**



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

## Mechanical Data

SOT-23 PACKAGE OUTLINE DIMENSION



Symbol	Dimension In Millimeters		Dimension In Inches	
	Min	Max	Min	Max
A	0.900	1.150	0.035	0.045
A1	0.000	0.100	0.000	0.004
A2	0.900	1.050	0.035	0.041
b	0.300	0.500	0.012	0.020
c	0.080	0.150	0.003	0.006
D	2.800	3.000	0.110	0.118
E	1.200	1.400	0.047	0.055
E1	2.250	2.550	0.089	0.100
e	0.95TYP		0.037TYP	
e1	1.800	2.000	0.071	0.079
L	0.55REF		0.022REF	
L1	0.300	0.500	0.012	0.020
$\theta$	$0^{\circ}$	$8^{\circ}$	$0^{\circ}$	$8^{\circ}$

**Ordering and Marking Information**

<p><b>Device Marking: 3339</b></p> <p><b>Package (Available)</b>  <b>SOT-23</b></p> <p><b>Operating Temperature Range</b>  <b>C : -55 to 150 °C</b></p>
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**Devices per Unit**

<b>Package Type</b>	<b>Units/ Tape</b>	<b>Tapes/ Inner Box</b>	<b>Units/ Inner Box</b>	<b>Inner Boxes/ Carton Box</b>	<b>Units/ Carton Box</b>
SOT-23	3000	10	30000	4	120000

**Reliability Test Program**

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