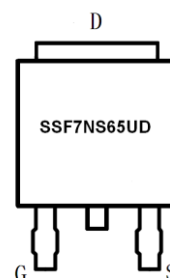
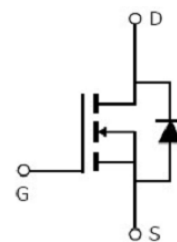


**Main Product Characteristics**

$V_{DS}$	650V
$R_{DS(on)}$	0.65Ω (typ.)
$I_D$	7A ①


**TO-252 (DPAK)**

**Marking and Pin Assignment**

**Schematic Diagram**
**Features and Benefits**

- High dv/dt and avalanche capabilities
- 100% avalanche tested
- Low input capacitance and gate charge
- Low gate input resistance


**Description**

The SSF7NS65UD series MOSFETs is a new technology, which combines an innovative technology and advance process. This new technology achieves low R<sub>ds(on)</sub>, energy saving, high reliability and uniformity, superior power density and space saving.

**Absolute Max Rating**

Symbol	Parameter	Max.	Units
$I_D$ @ TC = 25°C	Continuous Drain Current, $V_{GS}$ @ 10V	7 ①	A
$I_D$ @ TC = 100°C	Continuous Drain Current, $V_{GS}$ @ 10V	5①	
$I_{DM}$	Pulsed Drain Current ②	28	
$P_D$ @TC = 25°C	Power Dissipation ③	42	W
	Linear Derating Factor	0.33	W/°C
$V_{DS}$	Drain-Source Voltage	650	V
$V_{GS}$	Gate-to-Source Voltage	± 30	V
$E_{AS}$	Single Pulse Avalanche Energy @ L=100mH	480	mJ
$I_{AS}$	Avalanche Current @ L=100mH	3.1	A
$T_J$ $T_{STG}$	Operating Junction and Storage Temperature Range	-55 to +150	°C

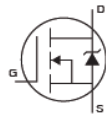
## Thermal Resistance

Symbol	Characteristics	Typ.	Max.	Units
$R_{\theta JC}$	Junction-to-case ③	—	3.0	$^{\circ}\text{C}/\text{W}$
$R_{\theta JA}$	Junction-to-ambient ( $t \leq 10\text{s}$ ) ④	—	62	$^{\circ}\text{C}/\text{W}$

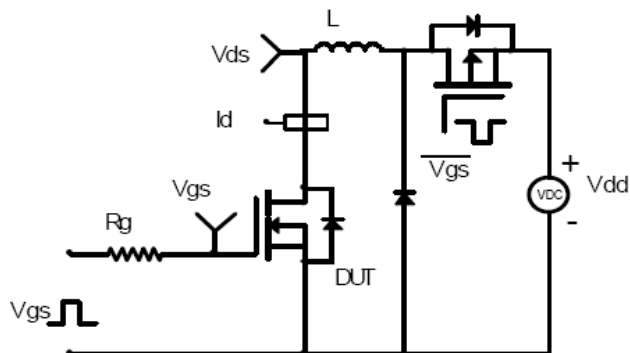
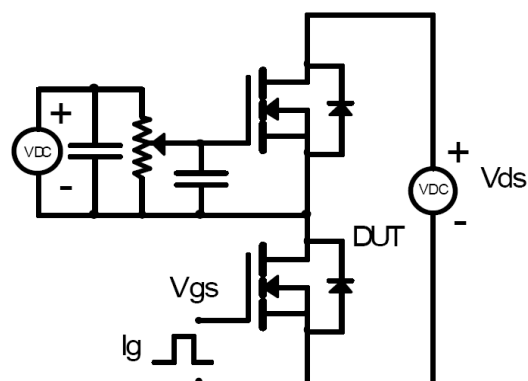
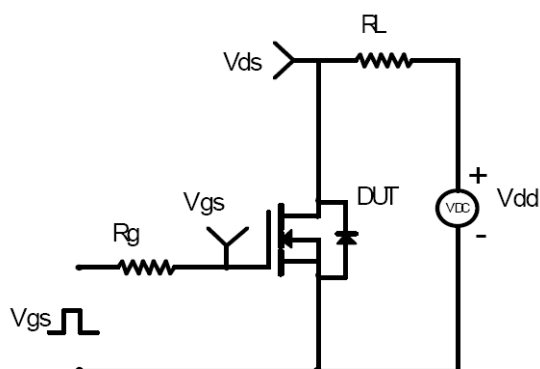
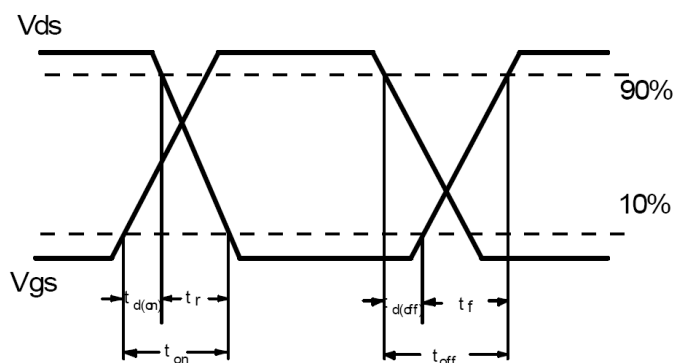
## Electrical Characteristics @ $T_A=25^{\circ}\text{C}$ unless otherwise specified

Symbol	Parameter	Min.	Typ.	Max.	Units	Conditions
$V_{(BR)DSS}$	Drain-to-Source breakdown voltage	650	—	—	V	$V_{GS} = 0\text{V}, I_D = 250\mu\text{A}$
$R_{DS(on)}$	Static Drain-to-Source on-resistance	—	0.65	0.75	$\Omega$	$V_{GS}=10\text{V}, I_D = 1\text{A}$ $T_J = 125^{\circ}\text{C}$
		—	1.38	—		
		—	0.77	0.85	$\Omega$	$V_{GS}=10\text{V}, I_D = 4.8\text{A}$ $T_J = 125^{\circ}\text{C}$
		—	2.0	—		
$V_{GS(th)}$	Gate threshold voltage	2	—	4	V	$V_{DS} = V_{GS}, I_D = 250\mu\text{A}$ $T_J = 125^{\circ}\text{C}$
		—	2.2	—		
$I_{DSS}$	Drain-to-Source leakage current	—	—	1	$\mu\text{A}$	$V_{DS} = 650\text{V}, V_{GS} = 0\text{V}$ $T_J = 125^{\circ}\text{C}$
		—	—	50		
$I_{GSS}$	Gate-to-Source forward leakage	—	—	100	nA	$V_{GS} = 30\text{V}$ $V_{GS} = -30\text{V}$
		—	—	-100		
$Q_g$	Total gate charge	—	13	—	nC	$I_D = 5\text{A},$ $V_{DS}=200\text{V},$ $V_{GS} = 10\text{V}$
$Q_{gs}$	Gate-to-Source charge	—	2.6	—		
$Q_{gd}$	Gate-to-Drain("Miller") charge	—	3.1	—		
$t_{d(on)}$	Turn-on delay time	—	9.6	—	ns	$V_{GS}=10\text{V}, V_{DS} = 400\text{V},$ $R_{GEN}=10.2\Omega, I_D = 2.2\text{A}$
$t_r$	Rise time	—	6	—		
$t_{d(off)}$	Turn-Off delay time	—	26	—		
$t_f$	Fall time	—	10	—		
$C_{iss}$	Input capacitance	—	500	—	pF	$V_{GS} = 0\text{V}$ $V_{DS} = 100\text{V}$ $f = 1\text{MHz}$
$C_{oss}$	Output capacitance	—	24	—		
$C_{rss}$	Reverse transfer capacitance	—	3	—		

## Source-Drain Ratings and Characteristics

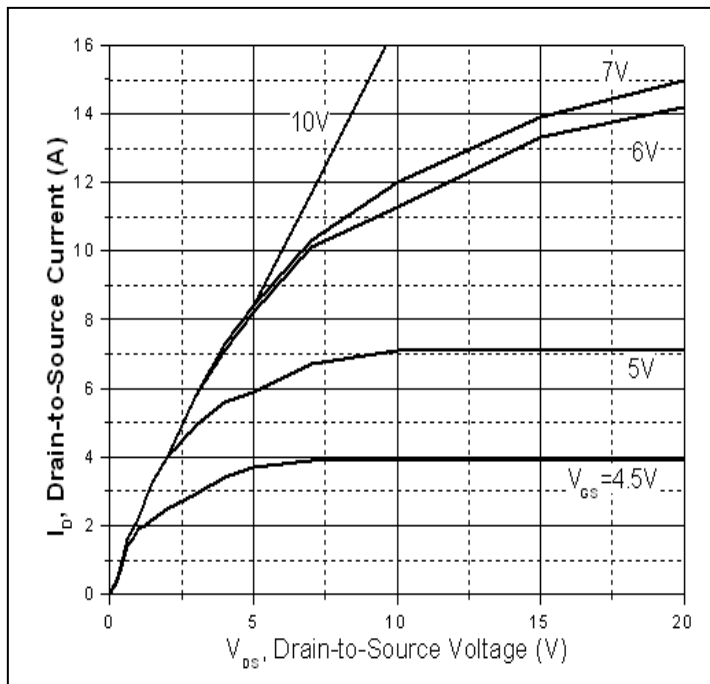
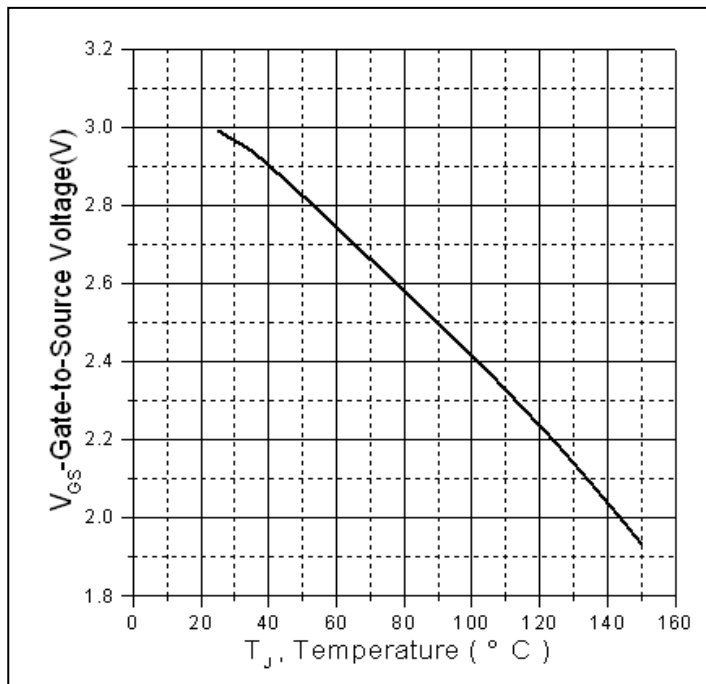
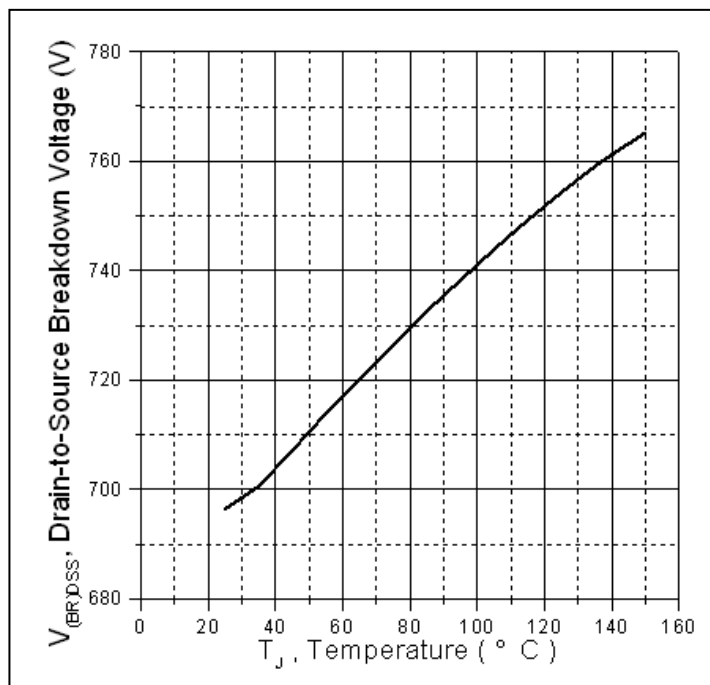
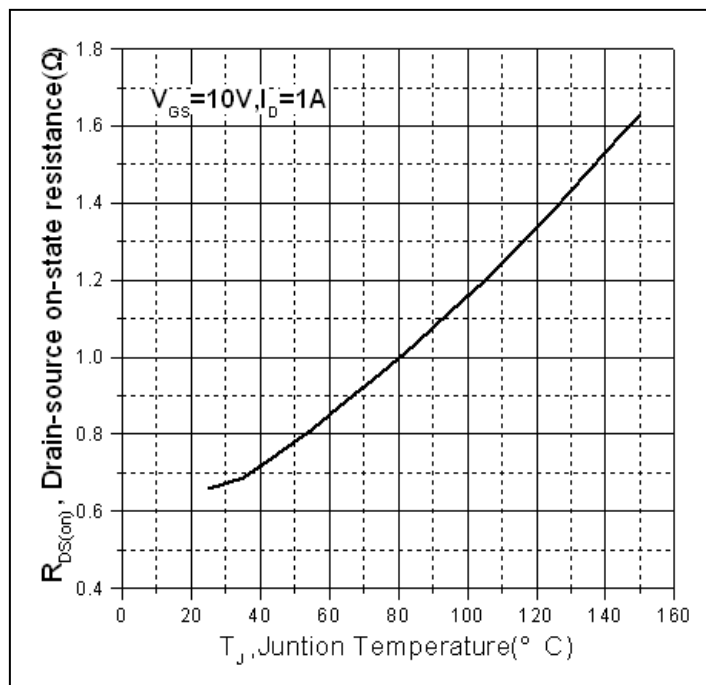
Symbol	Parameter	Min.	Typ.	Max.	Units	Conditions
$I_S$	Continuous Source Current (Body Diode)	—	—	7 ①	A	MOSFET symbol showing the integral reverse p-n junction diode. 
$I_{SM}$	Pulsed Source Current (Body Diode)	—	—	28	A	
$V_{SD}$	Diode Forward Voltage	—	0.85	1.2	V	$I_S=4.8\text{A}, V_{GS}=0\text{V}$
$t_{rr}$	Reverse Recovery Time	—	111	—	nS	$T_J = 25^{\circ}\text{C}, I_F = 2.2\text{A},$
$Q_{rr}$	Reverse Recovery Charge	—	639	—	nC	$di/dt = 100\text{A}/\mu\text{s}$

## Test circuits and Waveforms

**EAS Test Circuit:**

**Gate charge test circuit:**

**Switching Time Test Circuit:**

**Switching 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 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  $T_A = 25^\circ\text{C}$

**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

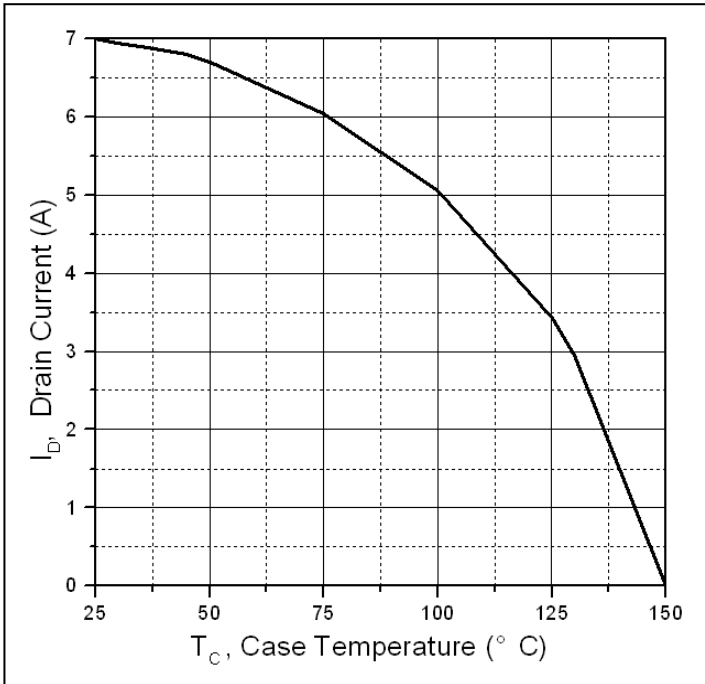


Figure 5. Maximum Drain Current Vs. Case Temperature

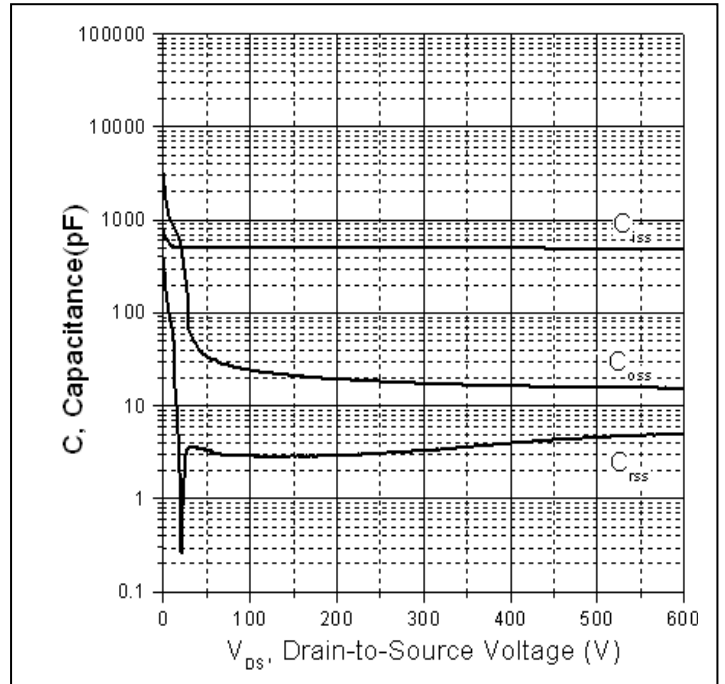


Figure 6. Typical Capacitance Vs. Drain-to-Source Voltage

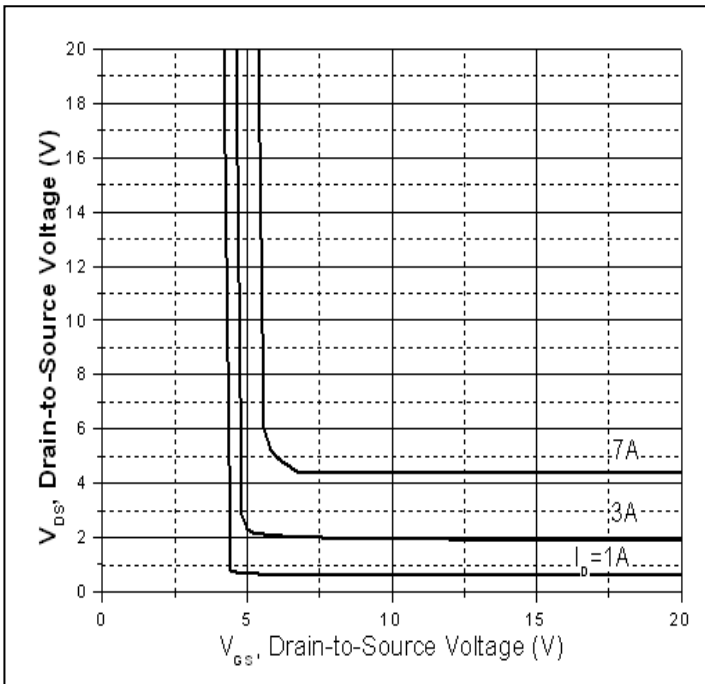


Figure 7. Drain-to-Source Voltage Vs. Gate-to-Source Voltage

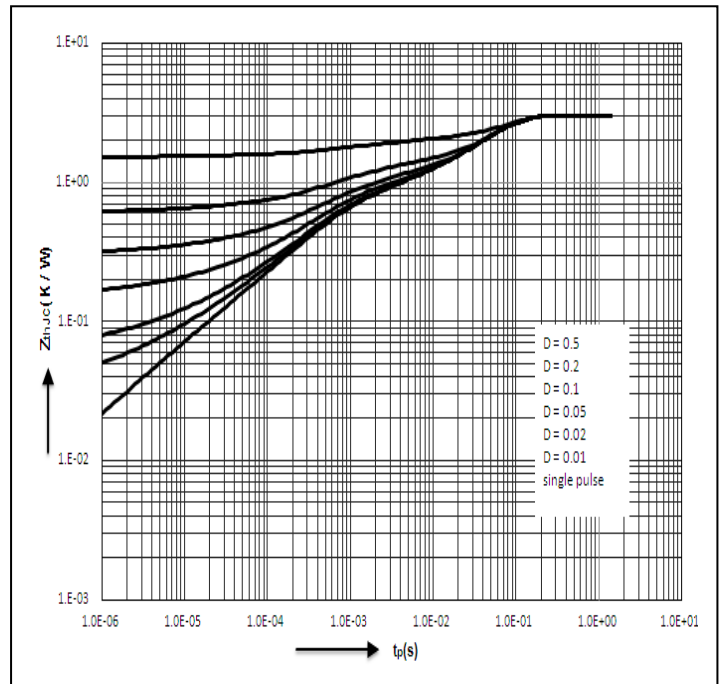
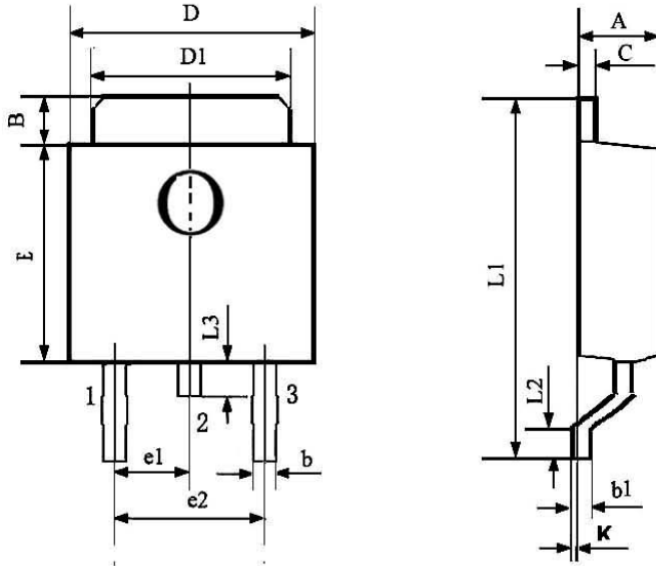


Figure 8. Maximum Effective Transient Thermal Impedance, Junction-to-Case

**Mechanical Data**
**TO-252 PACKAGE OUTLINE DIMENSION**


Symbol	Dimension In Millimeters			Dimension In Inches		
	Min	Nom	Max	Min	Nom	Max
A	2.200	-	2.400	0.087	-	0.094
B	0.950	-	1.250	0.037	-	0.049
b	0.500	-	0.700	0.020	-	0.028
b1	0.450	-	0.550	0.018	-	0.022
C	0.450	-	0.550	0.018	-	0.022
D	6.450	-	6.750	0.254	-	0.266
D1	5.200	-	5.400	0.205	-	0.213
E	5.950	-	6.250	0.234	-	0.246
e1	2.240	-	2.340	0.088	-	0.092
e2	4.430	-	4.730	0.174	-	0.186
L1	9.450	-	9.950	0.372	-	0.392
L2	1.250	-	1.750	0.049	-	0.069
L3	0.600	-	0.900	0.024	-	0.035
K	0.000	-	0.100	0.000	-	0.004

**Ordering and Marking Information**
**Device Marking: SSF7NS65UD**

**Package (Available)**  
**TO-252(DPAK)**  
**Operating Temperature Range**  
**C : -55 to 150 °C**

**Devices per Unit (options)**

Package Type	Units/Tape	Tapes/Inner Box	Units/Inner Box	Inner Boxes/Carton Box	Units/Carton Box
TO-252	2500	2	5000	7	35000
TO-252	2500	1	2500	10	25000
TO-252	800	5	4000	8	32000

**Reliability Test Program**

Test Item	Conditions	Duration	Sample Size
High Temperature Reverse Bias(HTRB)	T <sub>j</sub> =125°C to 150°C @ 80% of Max V <sub>DSS</sub> /V <sub>CES</sub> /VR	168 hours 500 hours 1000 hours	3 lots x 77 devices
High Temperature Gate Bias(HTGB)	T <sub>j</sub> =150°C @ 100% of Max V <sub>GSS</sub>	168 hours 500 hours 1000 hours	3 lots x 77 devices

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