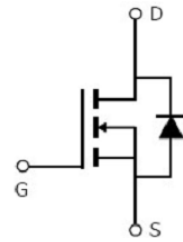


Main Product Characteristics:

V_{DS}	700V
$R_{DS(on)}$	0.7Ω (typ.)
I_D	7A ^①


IPAK-NX

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 SSF7NS70UGX series MOSFETs is a new technology, which combines an innovative technology and advance process. This new technology achieves low $R_{DS(on)}$, 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	4.3 ^①	
I_{DM}	Pulsed Drain Current ^②	21	
P_D @ TC = 25°C	Power Dissipation ^③	41	W
	Linear Derating Factor	0.33	W/°C
V_{DS}	Drain-Source Voltage	700	V
V_{GS}	Gate-to-Source Voltage	± 30	V
E_{AS}	Single Pulse Avalanche Energy @ L=100mH	112	mJ
I_{AS}	Avalanche Current @ L=100mH	1.5	A
T_J T_{STG}	Operating Junction and Storage Temperature Range	-55 to +150	°C

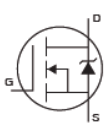
Thermal Resistance

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

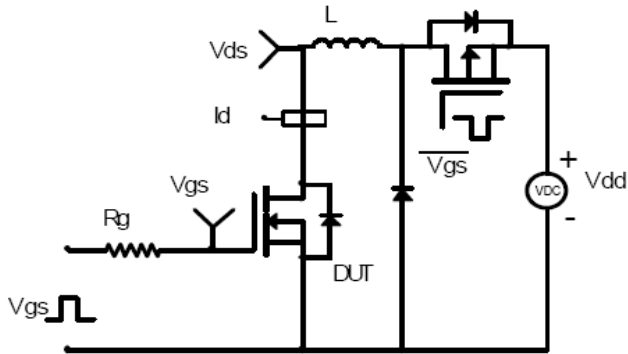
Symbol	Parameter	Min.	Typ.	Max.	Units	Conditions
$V_{(BR)DSS}$	Drain-to-Source breakdown voltage	700	—	—	V	$V_{GS} = 0\text{V}, I_D = 250\mu\text{A}$
$R_{DS(on)}$	Static Drain-to-Source on-resistance	—	0.7	0.85	Ω	$V_{GS}=10\text{V}, I_D = 1\text{A}$
		—	1.54	—		$T_J = 125^{\circ}\text{C}$
		—	0.85	0.95	Ω	$V_{GS}=10\text{V}, I_D = 4.8\text{A}$
		—	2.47	—		$T_J = 125^{\circ}\text{C}$
$V_{GS(th)}$	Gate threshold voltage	3	—	5	V	$V_{DS} = V_{GS}, I_D = 250\mu\text{A}$
		—	3.3	—		$T_J = 125^{\circ}\text{C}$
I_{DSS}	Drain-to-Source leakage current	—	—	1	μA	$V_{DS} = 700\text{V}, V_{GS} = 0\text{V}$
		—	—	50		$T_J = 125^{\circ}\text{C}$
I_{GSS}	Gate-to-Source forward leakage	—	—	100	nA	$V_{GS} = 30\text{V}$
		—	—	-100		$V_{GS} = -30\text{V}$
Q_g	Total gate charge	—	12	—	nC	$I_D = 2.2\text{A},$ $V_{DS}=480\text{V},$ $V_{GS} = 10\text{V}$
Q_{gs}	Gate-to-Source charge	—	3.2	—		
Q_{gd}	Gate-to-Drain("Miller") charge	—	5.2	—		
$t_{d(on)}$	Turn-on delay time	—	12	—	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	—	8.5	—		
$t_{d(off)}$	Turn-Off delay time	—	24	—		
t_f	Fall time	—	14	—		
C_{iss}	Input capacitance	—	528	—	pF	$V_{GS} = 0\text{V}$ $V_{DS} = 100\text{V}$ $f = 1\text{MHz}$
C_{oss}	Output capacitance	—	21	—		
C_{rss}	Reverse transfer capacitance	—	2.7	—		

Source-Drain Ratings and Characteristics

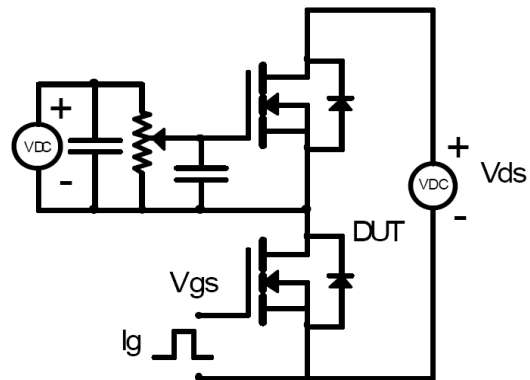
Symbol	Parameter	Min.	Typ.	Max.	Units	Conditions
I_S	Continuous Source Current (Body Diode)	—	—	7 ①	A	MOSFET symbol showing the integral reverse p-n junction diode. 
I_{SM}	Pulsed Source Current (Body Diode)	—	—	21	A	
V_{SD}	Diode Forward Voltage	—	0.85	1.2	V	$I_S=4.8\text{A}, V_{GS}=0\text{V}$
t_{rr}	Reverse Recovery Time	—	133	—	nS	$T_J = 25^{\circ}\text{C}, I_F = 2.2\text{A},$ $di/dt = 100\text{A}/\mu\text{s}$
Q_{rr}	Reverse Recovery Charge	—	819	—	nC	

Test circuits and Waveforms

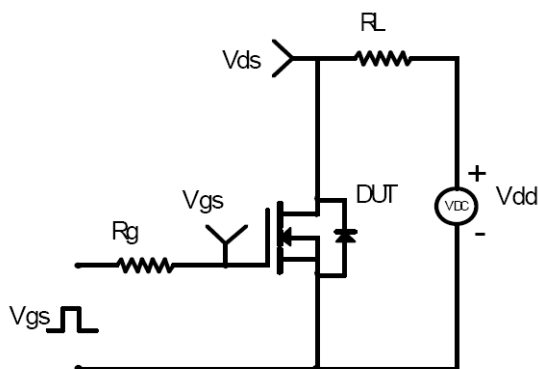
EAS Test Circuit:



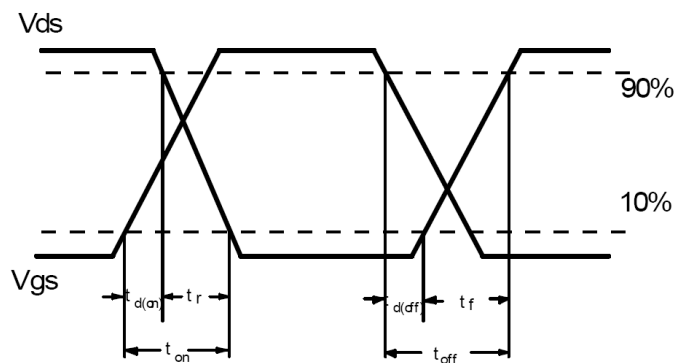
Gate charge test circuit:



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

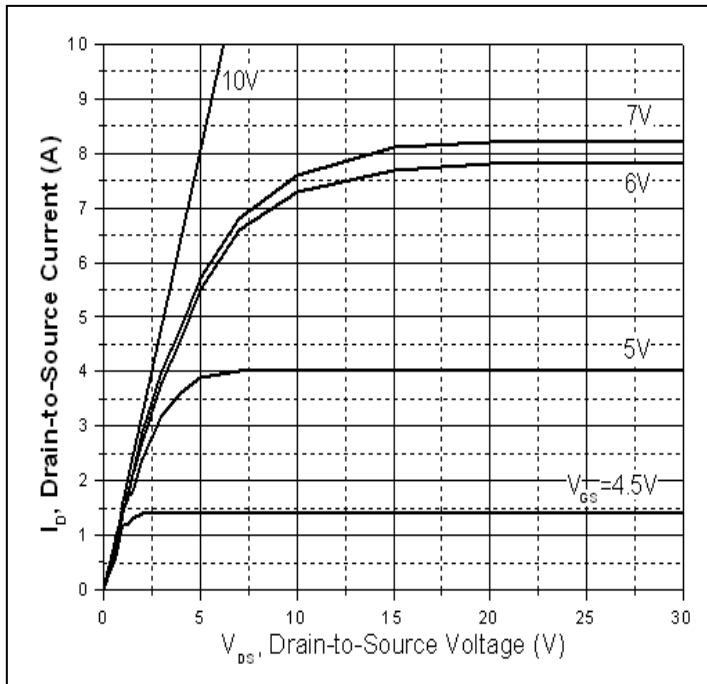


Figure 1: Typical Output Characteristics

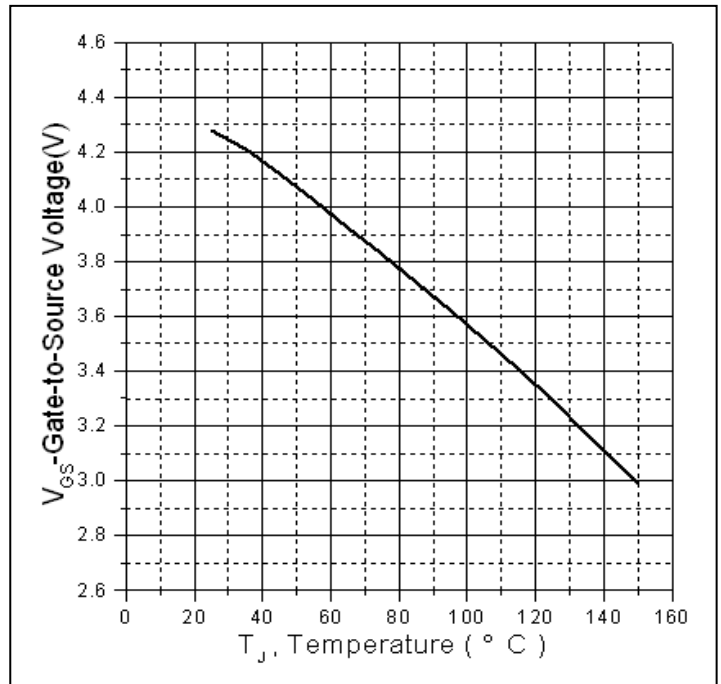


Figure 2. Gate to source cut-off voltage

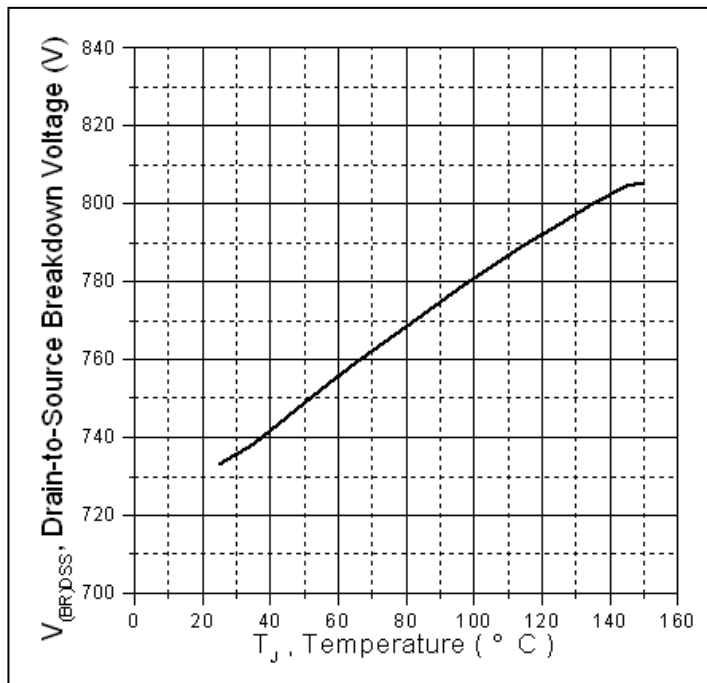


Figure 3. Drain-to-Source Breakdown Voltage Vs. Case Temperature

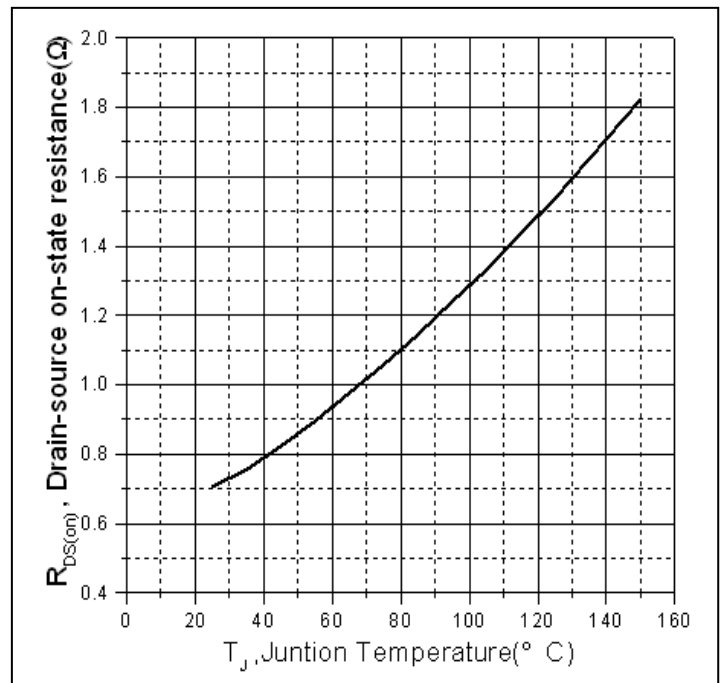


Figure 4: Normalized On-Resistance Vs. Case Temperature ($V_{GS}=10V, I_D = 1A$)

Typical electrical and thermal characteristics

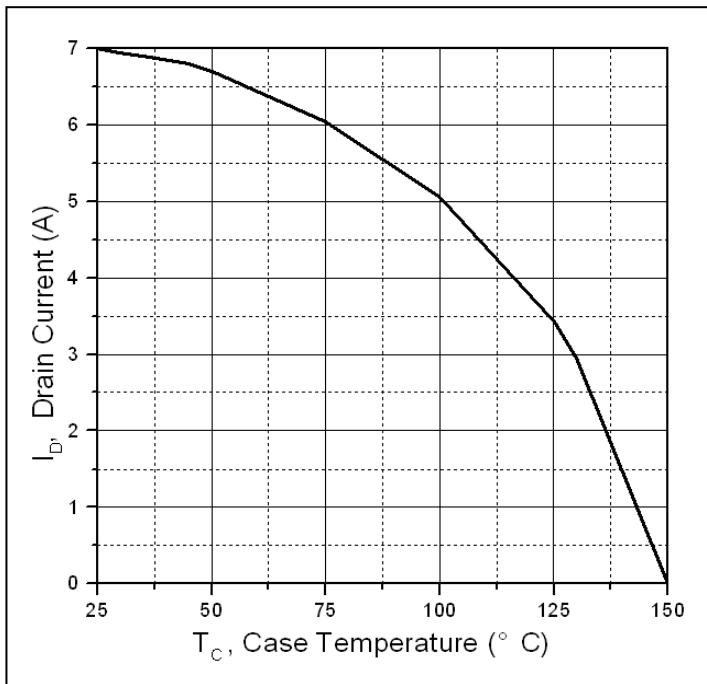


Figure 5. Maximum Drain Current Vs. Case Temperature

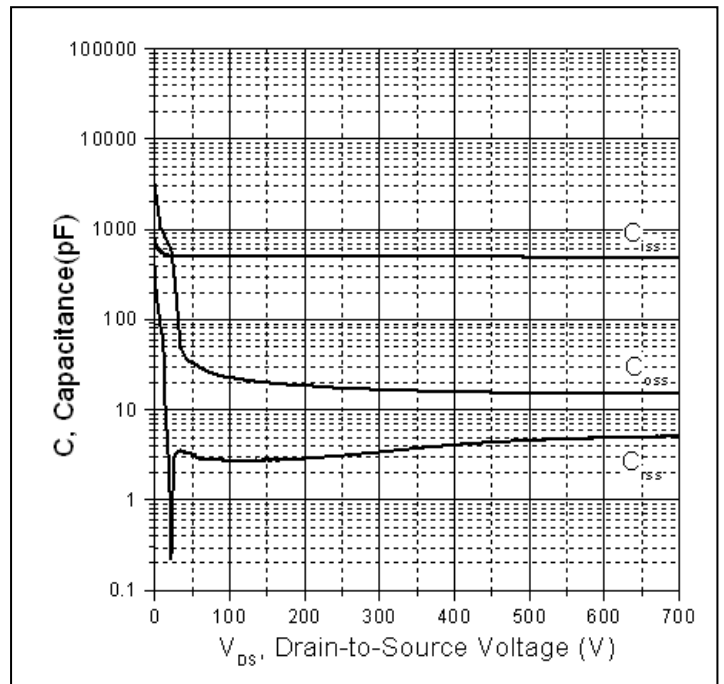


Figure 6. Typical Capacitance Vs. Drain-to-Source Voltage

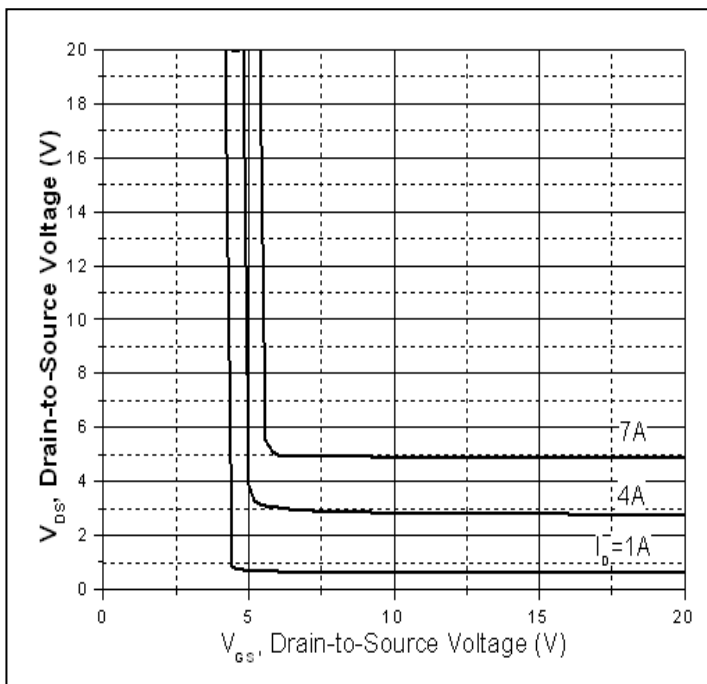


Figure7. Drain-to-Source Voltage Vs. Gate-to-Source Voltage

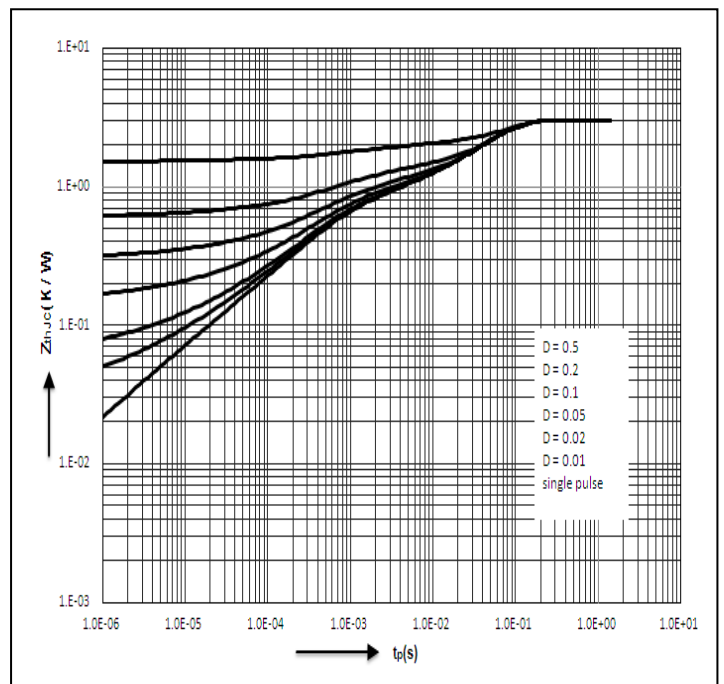
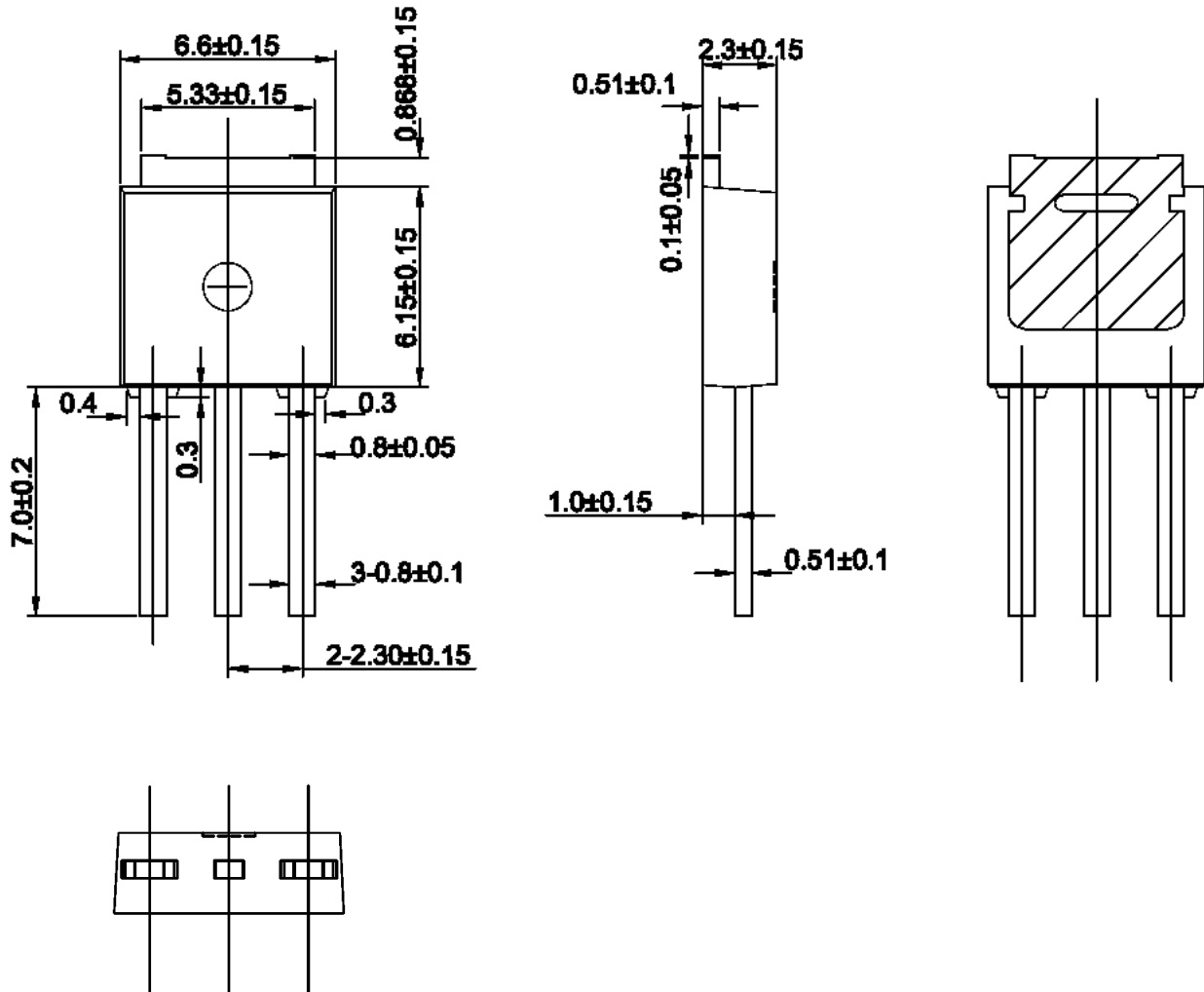


Figure8. Maximum Effective Transient Thermal Impedance, Junction-to-Case

Mechanical Data:

IPAK-NX Package outline dimension (Unit: mm)



Ordering and Marking Information**Device Marking: SSF7NS70UGX****Package (Available)****IPAK-NX****Operating Temperature Ranges****C : -55 to 150 °C****Devices per Unit**

Package Type	Units/ Tube	Tubes/Inner Box	Units/Inner Box	Inner Boxes/Carton Box	Units/Carton Box
IPAK-NX	80	56	4480	5	22400

Reliability Test Program

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

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Sales@silikron.com

Technical Support:

Technical@silikron.com

Suzhou Silikron Semiconductor Corp.

11A, 428 Xinglong Street, Suzhou Industrial Park, P.R.China

TEL: (86-512) 62560688

FAX: (86-512) 65160705

E-mail: Sales@silikron.com