

Absolute Maximum Ratings ($T_A = 25^\circ\text{C}$ Unless Otherwise Noted)

Symbol	Parameter		Rating	Unit
Common Ratings				
V _{DSS}	Drain-Source Voltage		-60	V
V _{GSS}	Gate-Source Voltage		±20	
T _J	Maximum Junction Temperature		150	°C
T _{STG}	Storage Temperature Range		-55 to 150	°C
I _S	Diode Continuous Forward Current		-13	A
I _{AS} ^a	Avalanche Current, Single pulse	L=0.5mH	-17	A
E _{AS} ^a	Avalanche Energy, Single pulse	L=0.5mH	72	mJ
I _{DP} ^b	Pulse Drain Current Tested	T _C =25°C	-80 ^c	A
I _D	Continuous Drain Current	T _C =25°C	-26	
		T _C =100°C	-16	
P _D	Maximum Power Dissipation	T _C =25°C	54	W
		T _C =100°C	21	
R _{θJC}	Thermal Resistance-Junction to Case		2.3	°C/W
I _D	Continuous Drain Current	T _A =25°C	-5.3	A
		T _A =70°C	-4.2	
P _D	Maximum Power Dissipation	T _A =25°C	2.2	W
		T _A =70°C	1.4	
R _{θJA} ^d	Thermal Resistance-Junction to Ambient	Steady State	55	°C/W

Note a : UIS tested and pulse width limited by maximum junction temperature 150°C (initial temperature $T_J=25^\circ\text{C}$).

Note b : Pulse width limited by max. junction temperature.

Note c : Wire limited.

Note d : $R_{\theta JA}$ steady state $t=999\text{s}$. $R_{\theta JA}$ is measured with the device mounted on 1in^2 , FR-4 board with 2oz. Copper.

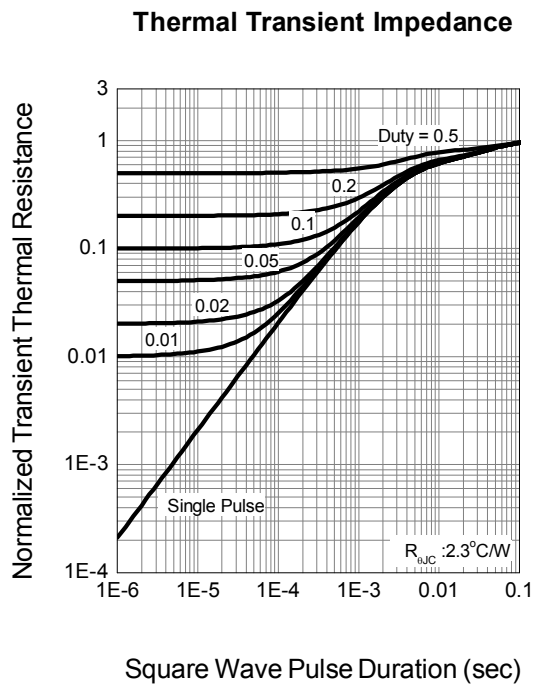
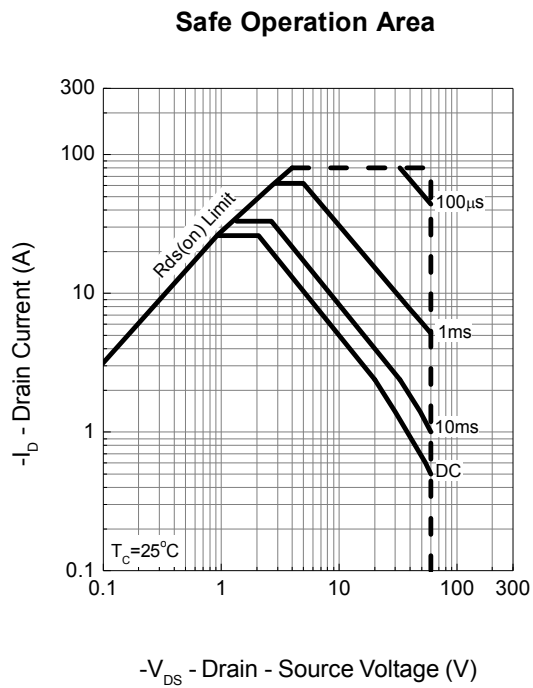
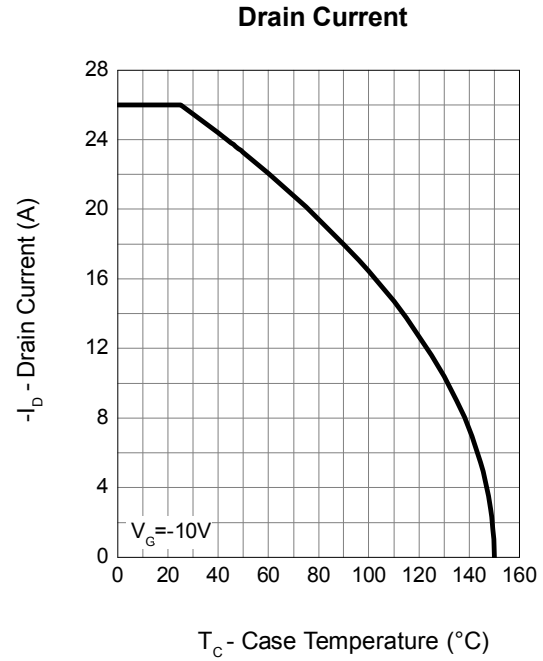
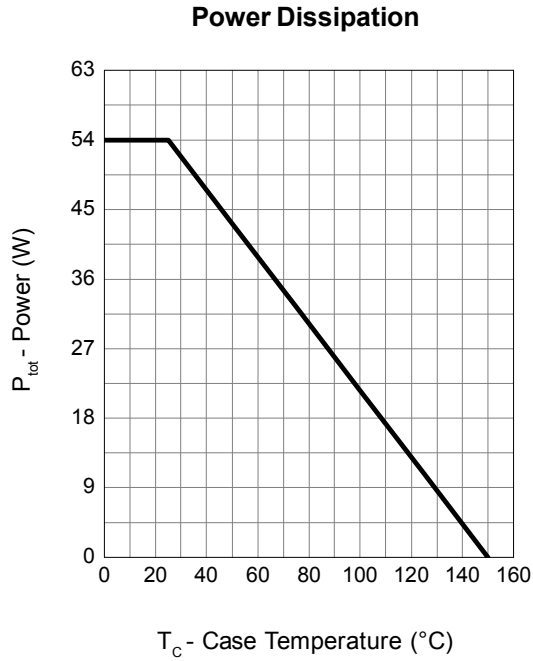
Electrical Characteristics ($T_A = 25^\circ\text{C}$ Unless Otherwise Noted)

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
Static Characteristics						
BV _{DSS}	Drain-Source Breakdown Voltage	V _{GS} =0V, I _{DS} =-250μA	-60	-	-	V
I _{DSS}	Zero Gate Voltage Drain Current	V _{DS} =-48V, V _{GS} =0V	-	-	1	μA
		T _J =85°C	-	-	-30	
V _{GS(th)}	Gate Threshold Voltage	V _{DS} =V _{GS} , I _{DS} =-250μA	-1.3	-1.8	-2.3	V
I _{GSS}	Gate Leakage Current	V _{GS} =±20V, V _{DS} =0V	-	-	±100	nA
R _{DS(ON)} ^e	Drain-Source On-state Resistance	V _{GS} =-10V, I _{DS} =-20A	-	32	40	mΩ
		V _{GS} =-4.5V, I _{DS} =-20A	-	40	54	mΩ
Diode Characteristics						
V _{SD} ^e	Diode Forward Voltage	I _{SD} =-1A, V _{GS} =0V	-	-0.7	-1	V
t _{rr}	Reverse Recovery Time	I _{SD} =-20A, dI _{SD} /dt=100A/μs	-	23	-	ns
Q _{rr}	Reverse Recovery Charge		-	22	-	nC
Dynamic Characteristics ^f						
R _G	Gate Resistance	V _{GS} =0V, V _{DS} =0V, f=1MHz	-	8	16	Ω
C _{iss}	Input Capacitance	V _{GS} =0V, V _{DS} =-30V, Frequency=1.0MHz	-	1416	1840	pF
C _{oss}	Output Capacitance		-	142	-	
C _{rss}	Reverse Transfer Capacitance		-	85	-	
t _{d(ON)}	Turn-on Delay Time	V _{DD} =-30V, R _L =30Ω, I _{DS} =-1A, V _{GEN} =-10V, R _G =6Ω	-	10	18	ns
t _r	Turn-on Rise Time		-	9	16	
t _{d(OFF)}	Turn-off Delay Time		-	88	158	
t _f	Turn-off Fall Time		-	42	76	
Gate Charge Characteristics ^f						
Q _g	Total Gate Charge	V _{DS} =-30V, V _{GS} =-10V, I _{DS} =-20A	-	32	45	nC
Q _{gs}	Gate-Source Charge		-	3.6	-	
Q _{gd}	Gate-Drain Charge		-	8.3	-	

Note e : Pulse test; pulse width $\leq 300\mu s$, duty cycle $\leq 2\%$.

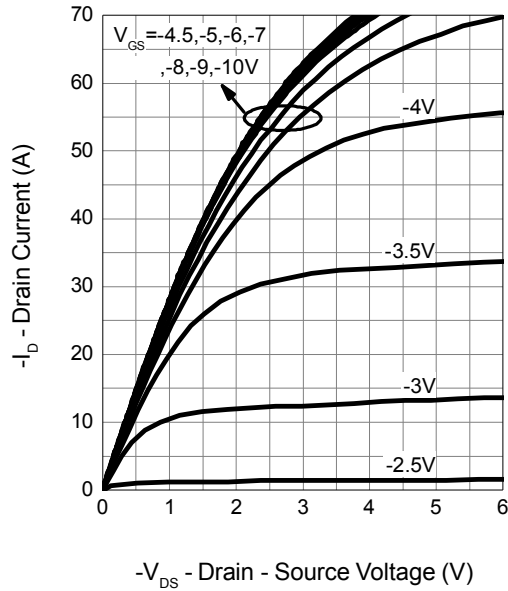
Note f : Guaranteed by design, not subject to production testing.

Typical Operating Characteristics

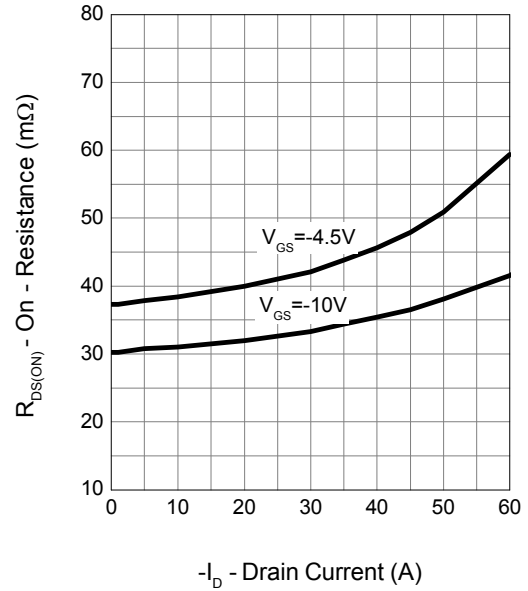


Typical Operating Characteristics (Cont.)

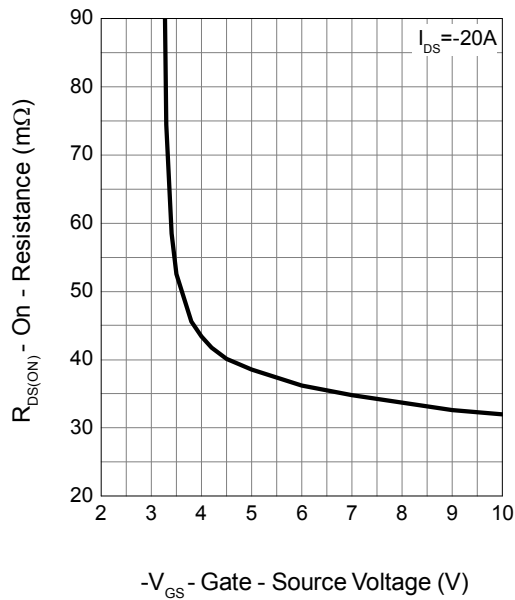
Output Characteristics



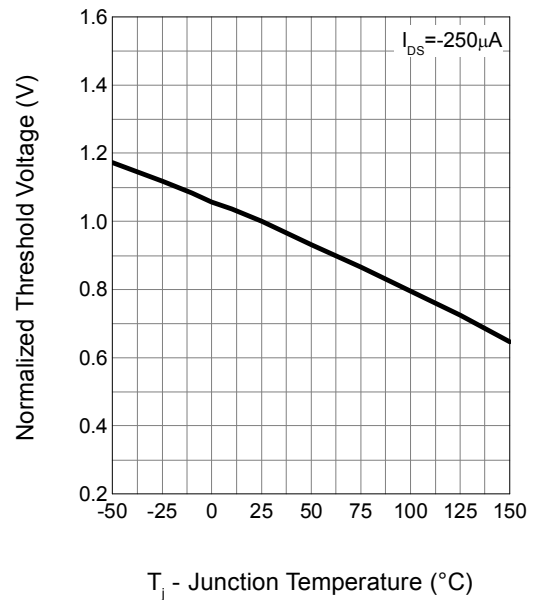
Drain-Source On Resistance



Gate-Source On Resistance

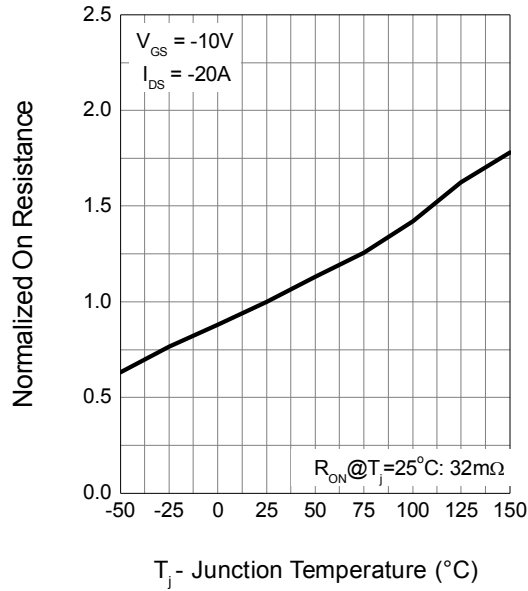


Gate Threshold Voltage

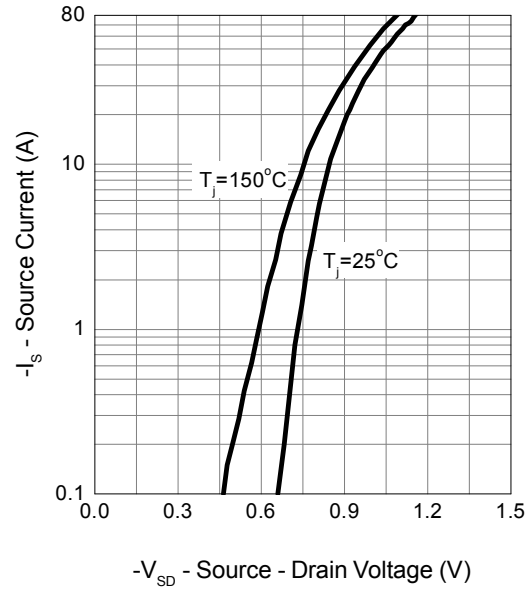


Typical Operating Characteristics (Cont.)

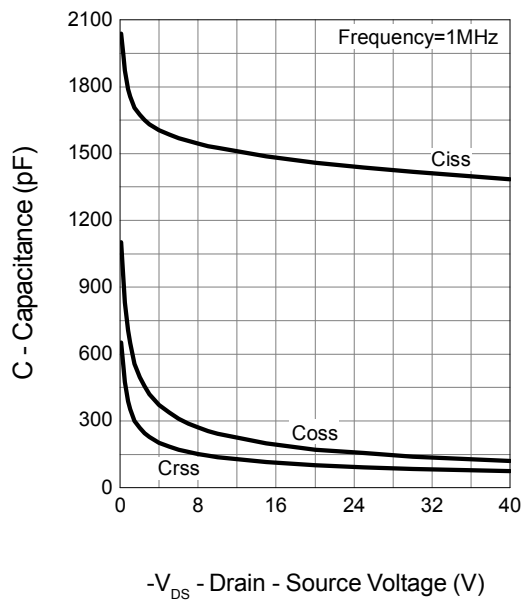
Drain-Source On Resistance



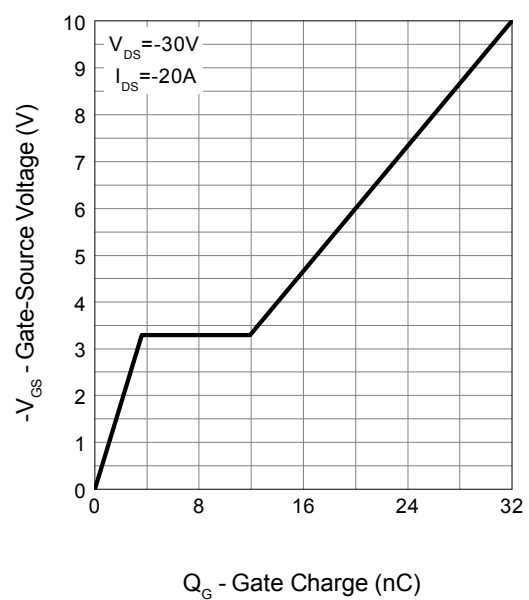
Source-Drain Diode Forward



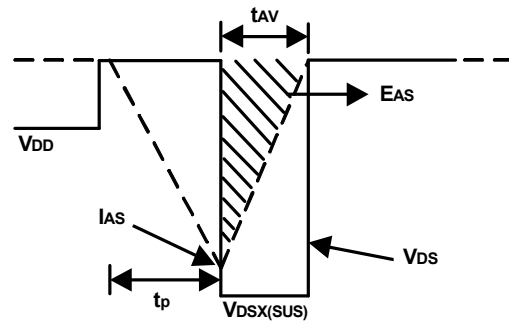
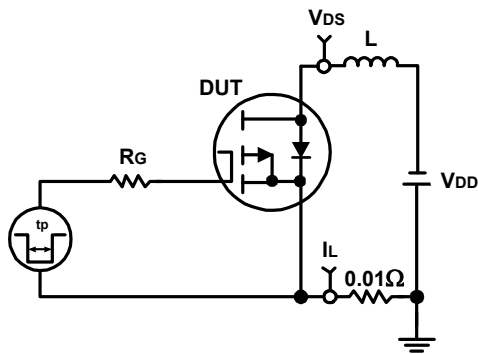
Capacitance



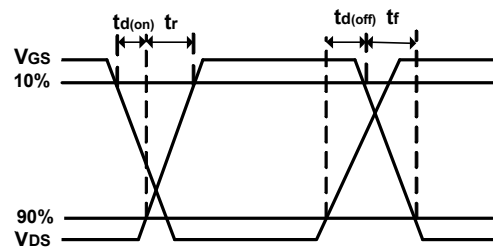
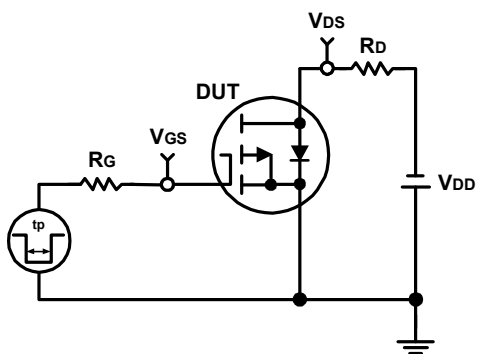
Gate Charge



Avalanche Test Circuit and Waveforms



Switching Time Test Circuit and Waveforms



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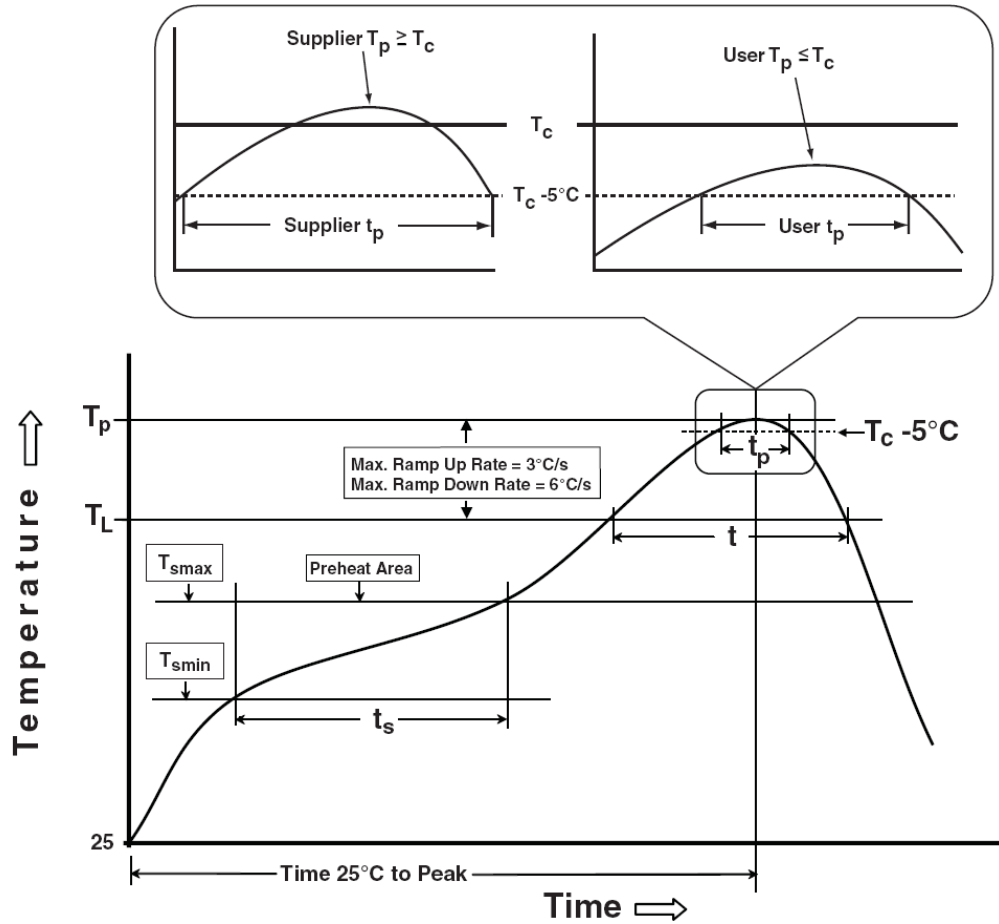
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Classification Profile



Classification Reflow Profiles

Profile Feature	Sn-Pb Eutectic Assembly	Pb-Free Assembly
Preheat & Soak Temperature min (T_{smin}) Temperature max (T_{smax}) Time (T_{smin} to T_{smax}) (t_s)	100 °C 150 °C 60-120 seconds	150 °C 200 °C 60-120 seconds
Average ramp-up rate (T_{smax} to T_p)	3 °C/second max.	3°C/second max.
Liquidous temperature (T_L) Time at liquidous (t_L)	183 °C 60-150 seconds	217 °C 60-150 seconds
Peak package body Temperature (T_p)*	See Classification Temp in table 1	See Classification Temp in table 2
Time (t_p)** within 5°C of the specified classification temperature (T_c)	20** seconds	30** seconds
Average ramp-down rate (T_p to T_{smax})	6 °C/second max.	6 °C/second max.
Time 25°C to peak temperature	6 minutes max.	8 minutes max.
* Tolerance for peak profile Temperature (T_p) is defined as a supplier minimum and a user maximum. ** Tolerance for time at peak profile temperature (t_p) is defined as a supplier minimum and a user maximum.		

Table 1. SnPb Eutectic Process – Classification Temperatures (T_c)

Package Thickness	Volume mm ³ <350	Volume mm ³ ≥350
<2.5 mm	235 °C	220 °C
≥2.5 mm	220 °C	220 °C

Table 2. Pb-free Process – Classification Temperatures (T_c)

Package Thickness	Volume mm ³ <350	Volume mm ³ 350-2000	Volume mm ³ >2000
<1.6 mm	260 °C	260 °C	260 °C
1.6 mm – 2.5 mm	260 °C	250 °C	245 °C
≥2.5 mm	250 °C	245 °C	245 °C

Reliability Test Program

Test item	Method	Description
SOLDERABILITY	JESD-22, B102	5 Sec, 245°C
HTRB	JESD-22, A108	1000 Hrs, 80% of VDS max @ T_{jmax}
HTGB	JESD-22, A108	1000 Hrs, 100% of VGS max @ T_{jmax}
PCT	JESD-22, A102	168 Hrs, 100%RH, 2atm, 121°C
TCT	JESD-22, A104	500 Cycles, -65°C~150°C

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