

SWITCHING P-CHANNEL MOS FET

DESCRIPTION

The μPA2713GR is P-channel MOS Field Effect Transistor designed for power management applications of notebook computers and Li-ion battery protection circuit.

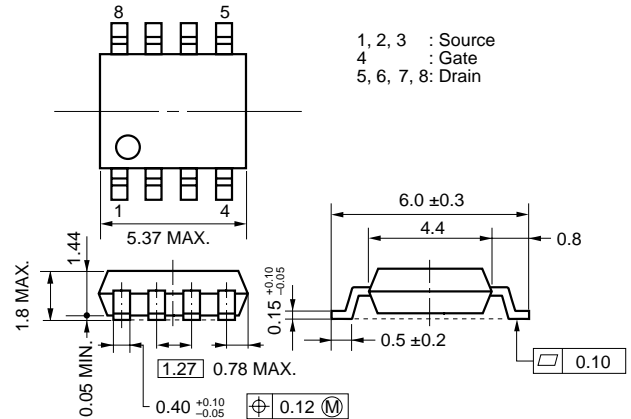
FEATURES

- Low on-state resistance
 $R_{DS(on)1} = 16 \text{ m}\Omega \text{ MAX. (} V_{GS} = -10 \text{ V, } I_D = -4.0 \text{ A)}$
 $R_{DS(on)2} = 25 \text{ m}\Omega \text{ MAX. (} V_{GS} = -4.5 \text{ V, } I_D = -4.0 \text{ A)}$
 $R_{DS(on)3} = 30 \text{ m}\Omega \text{ MAX. (} V_{GS} = -4.0 \text{ V, } I_D = -4.0 \text{ A)}$
- Low C_{iss} : $C_{iss} = 1600 \text{ pF TYP.}$
- Small and surface mount package (Power SOP8)

ORDERING INFORMATION

PART NUMBER	PACKAGE
μPA2713GR	Power SOP8

PACKAGE DRAWING (Unit: mm)



ABSOLUTE MAXIMUM RATINGS ($T_A = 25^\circ\text{C}$, All terminals are connected.)

Drain to Source Voltage ($V_{GS} = 0 \text{ V}$)	V_{DSS}	-30	V
Gate to Source Voltage ($V_{DS} = 0 \text{ V}$)	V_{GSS}	±20	V
Drain Current (DC)	$I_{D(DC)}$	±8	A
Drain Current (pulse) ^{Note1}	$I_{D(pulse)}$	±32	A
Total Power Dissipation ^{Note2}	P_{T1}	2	W
Total Power Dissipation ^{Note3}	P_{T2}	2	W
Channel Temperature	T_{ch}	150	°C
Storage Temperature	T_{stg}	-55 to +150	°C
Single Avalanche Current ^{Note4}	I_{AS}	8	A
Single Avalanche Energy ^{Note4}	E_{AS}	6.4	mJ

Notes 1. $PW \leq 10 \mu\text{s}$, Duty Cycle $\leq 1\%$

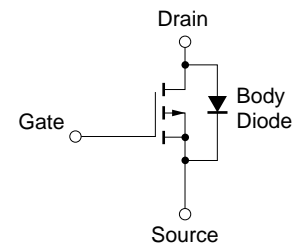
2. Mounted on ceramic substrate of $1200 \text{ mm}^2 \times 2.2 \text{ mm}$

3. Mounted on a glass epoxy board (1 inch x 1 inch x 0.8 mm), $PW = 10 \text{ sec}$

4. Starting $T_{ch} = 25^\circ\text{C}$, $V_{DD} = -15 \text{ V}$, $R_G = 25 \Omega$, $L = 100 \mu\text{H}$, $V_{GS} = -20 \rightarrow 0 \text{ V}$

Remark Strong electric field, when exposed to this device, can cause destruction of the gate oxide and ultimately degrade the device operation. Steps must be taken to stop generation of static electricity as much as possible, and quickly dissipate it once, when it has occurred.

EQUIVALENT CIRCUIT



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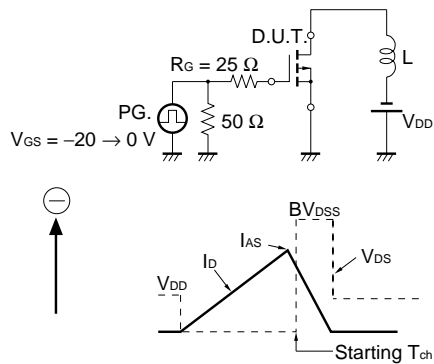
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ELECTRICAL CHARACTERISTICS (T_A = 25°C, All terminals are connected.)

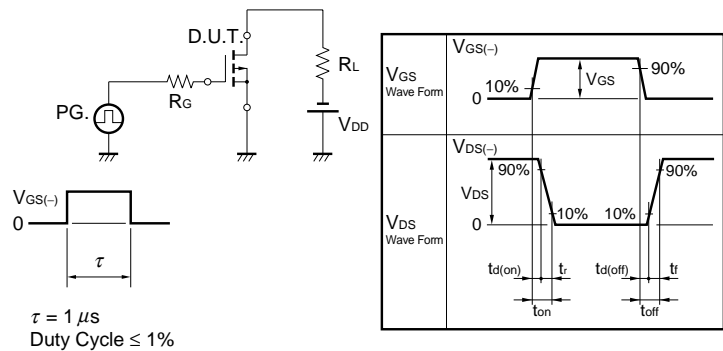
CHARACTERISTICS	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNIT
Zero Gate Voltage Drain Current	I _{DSS}	V _{DS} = -30 V, V _{GS} = 0 V			-1	μA
Gate Leakage Current	I _{GSS}	V _{GS} = ±20 V, V _{DS} = 0 V			±100	nA
Gate Cut-off Voltage ^{Note}	V _{GS(off)}	V _{DS} = -10 V, I _D = -1 mA	-1.0		-2.5	V
Forward Transfer Admittance ^{Note}	y _{fs}	V _{DS} = -10 V, I _D = -4.0 A	6	14		S
Drain to Source On-state Resistance ^{Note}	R _{DSON1}	V _{GS} = -10 V, I _D = -4.0 A		12	16	mΩ
	R _{DSON2}	V _{GS} = -4.5 V, I _D = -4.0 A		17	25	mΩ
	R _{DSON3}	V _{GS} = -4.0 V, I _D = -4.0 A		20	30	mΩ
Input Capacitance	C _{iss}	V _{DS} = -10 V		1600		pF
Output Capacitance	C _{oss}	V _{GS} = 0 V		450		pF
Reverse Transfer Capacitance	C _{rss}	f = 1 MHz		270		pF
Turn-on Delay Time	t _{d(on)}	V _{DD} = -15 V, I _D = -4.0 A		9		ns
Rise Time	t _r	V _{GS} = -10 V		15		ns
Turn-off Delay Time	t _{d(off)}	R _G = 10 Ω		83		ns
Fall Time	t _f			43		ns
Total Gate Charge	Q _G	V _{DD} = -24 V		35		nC
Gate to Source Charge	Q _{GS}	V _{GS} = -10 V		4.8		nC
Gate to Drain Charge	Q _{GD}	I _D = 8 A		10		nC
Body Diode Forward Voltage	V _{F(S-D)}	I _F = 8 A, V _{GS} = 0 V		0.81		V
Reverse Recovery Time	t _{rr}	I _F = 8 A, V _{GS} = 0 V		43		ns
Reverse Recovery Charge	Q _{rr}	di/dt = 100 A/μs		29		nC

Note Pulsed: PW ≤ 350 μs, Duty Cycle ≤ 2%

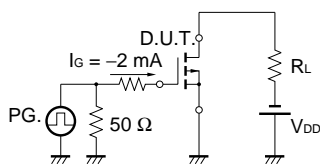
TEST CIRCUIT 1 AVALANCHE CAPABILITY



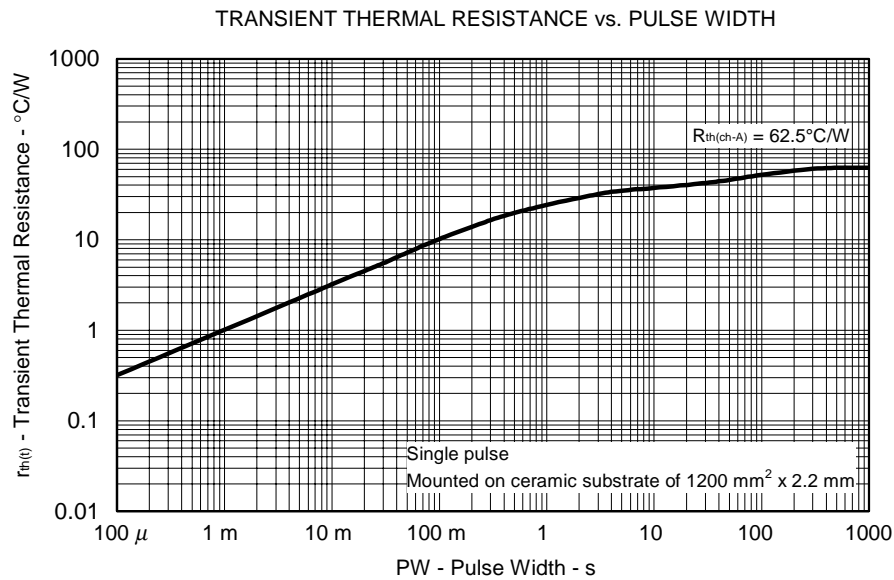
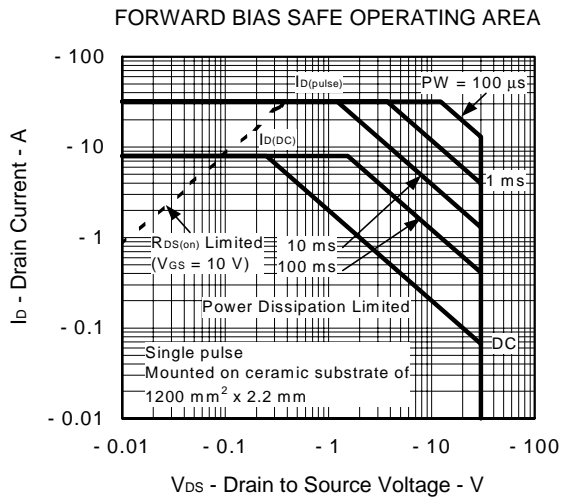
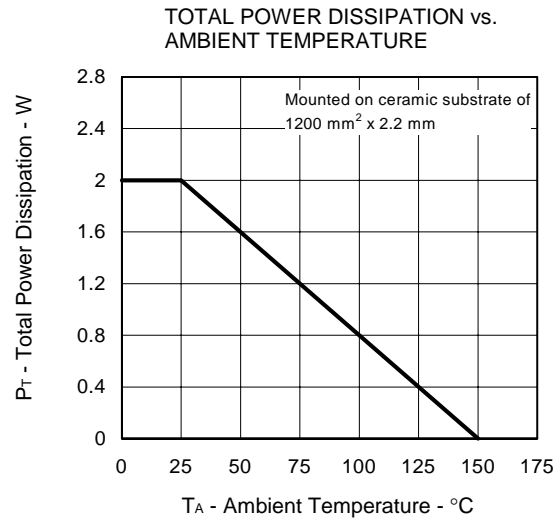
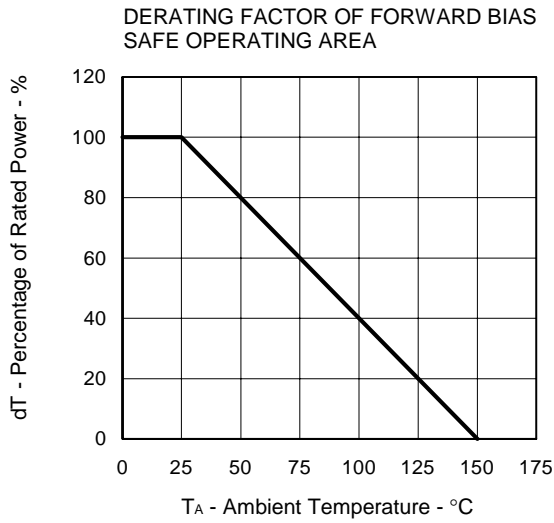
TEST CIRCUIT 2 SWITCHING TIME



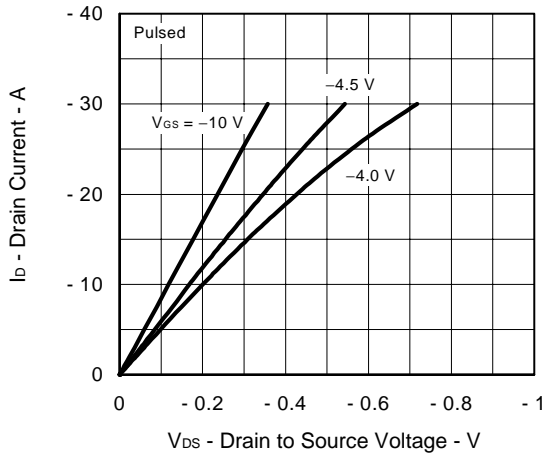
TEST CIRCUIT 3 GATE CHARGE



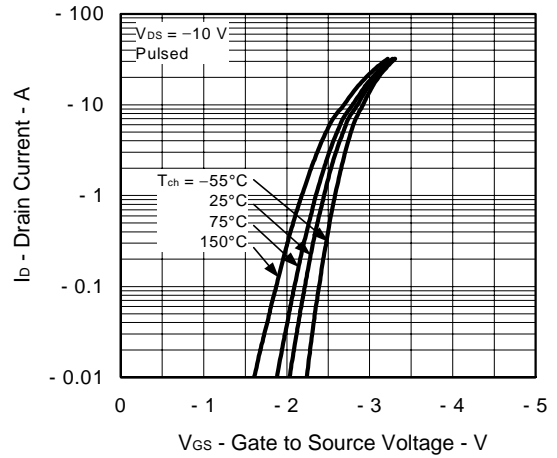
TYPICAL CHARACTERISTICS ($T_A = 25^\circ\text{C}$, All terminals are connected.)



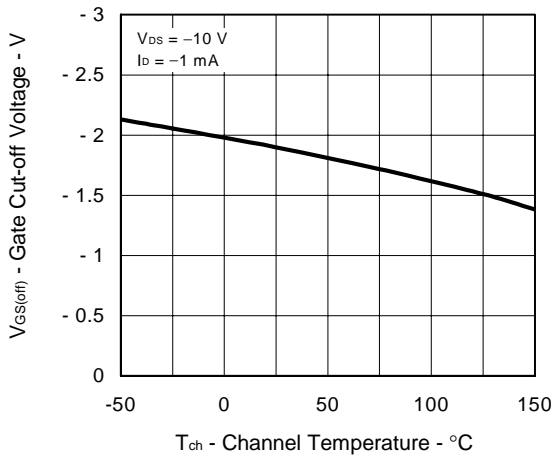
DRAIN CURRENT vs. DRAIN TO SOURCE VOLTAGE



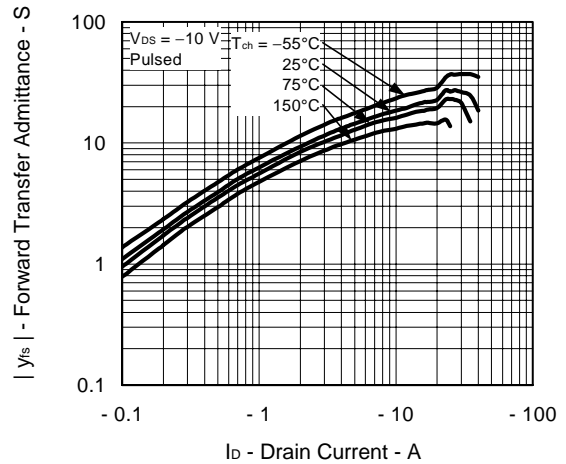
FORWARD TRANSFER CHARACTERISTICS



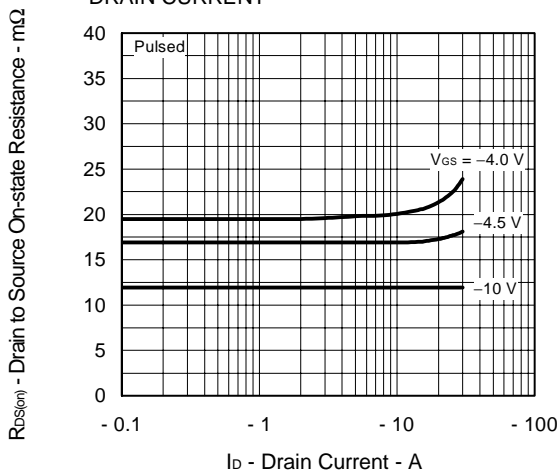
GATE CUT-OFF VOLTAGE vs. CHANNEL TEMPERATURE



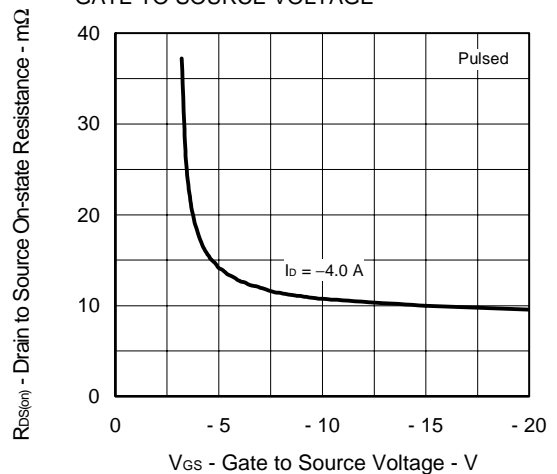
FORWARD TRANSFER ADMITTANCE vs. DRAIN CURRENT



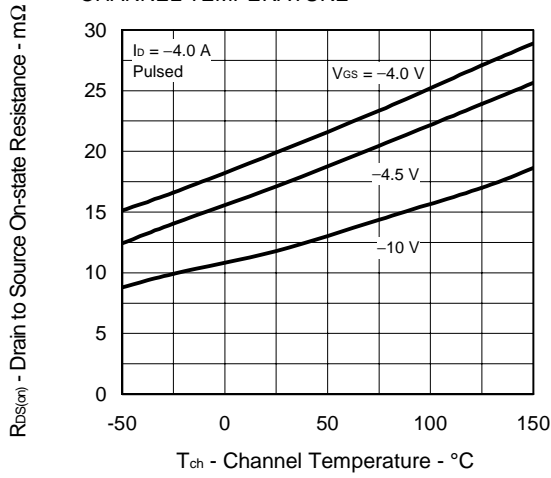
DRAIN TO SOURCE ON-STATE RESISTANCE vs. DRAIN CURRENT



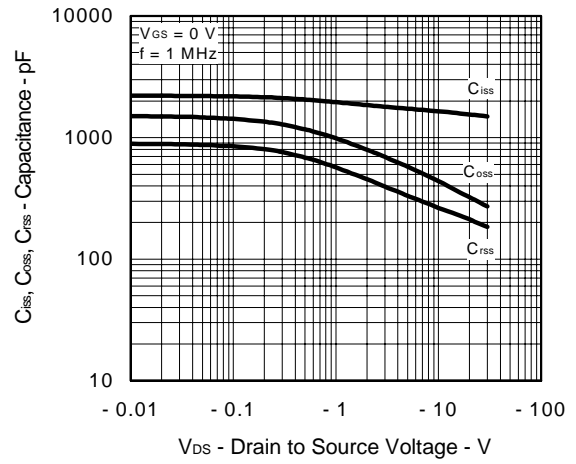
DRAIN TO SOURCE ON-STATE RESISTANCE vs. GATE TO SOURCE VOLTAGE



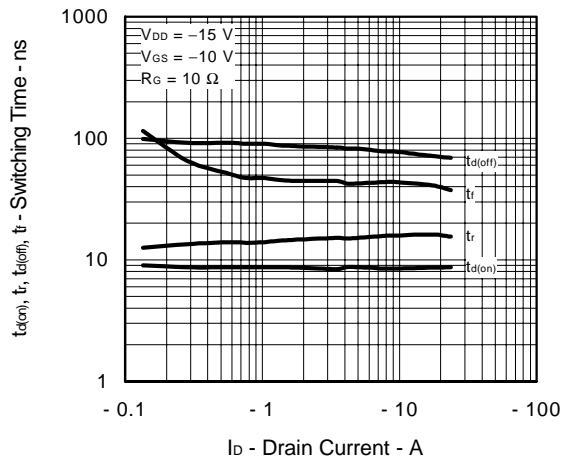
DRAIN TO SOURCE ON-STATE RESISTANCE vs. CHANNEL TEMPERATURE



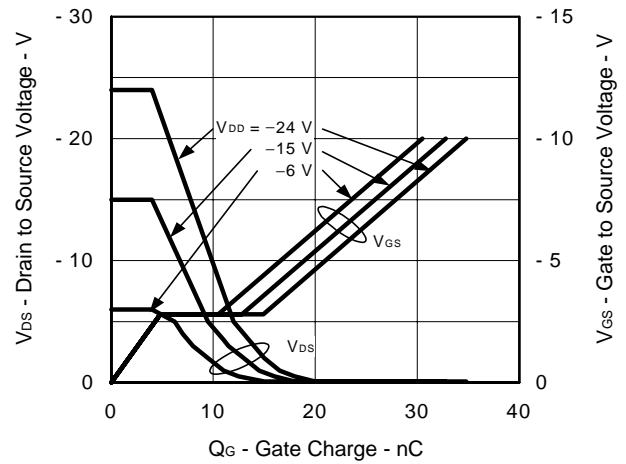
CAPACITANCE vs. DRAIN TO SOURCE VOLTAGE



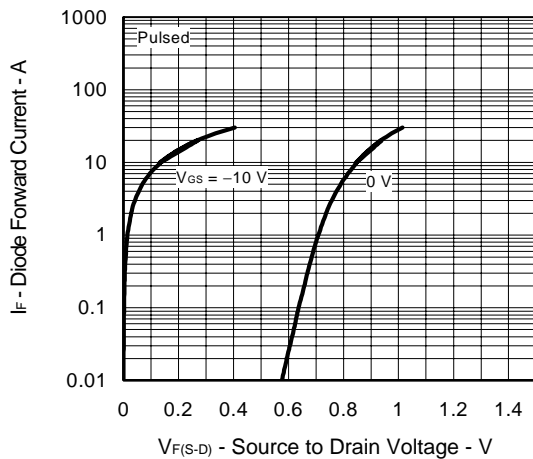
SWITCHING CHARACTERISTICS



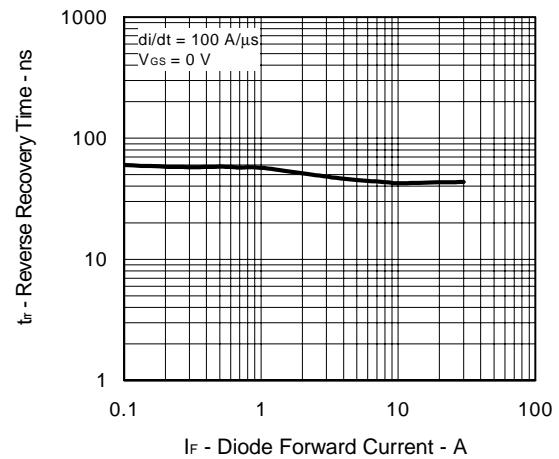
DYNAMIC INPUT/OUTPUT CHARACTERISTICS



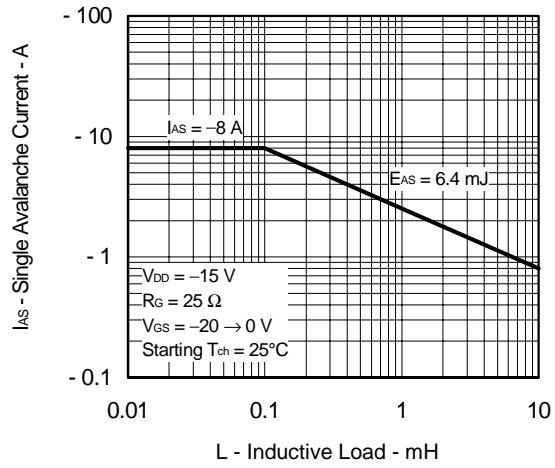
SOURCE TO DRAIN DIODE FORWARD VOLTAGE



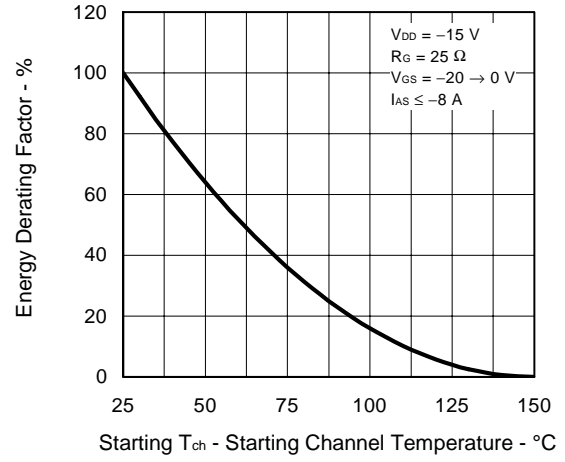
REVERSE RECOVERY TIME vs. DIODE FORWARD CURRENT



SINGLE AVALANCHE CURRENT vs. INDUCTIVE LOAD



SINGLE AVALANCHE ENERGY DERATING FACTOR



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