

**6N70-P****Power MOSFET****6.0A, 700V N-CHANNEL
POWER MOSFET****DESCRIPTION**

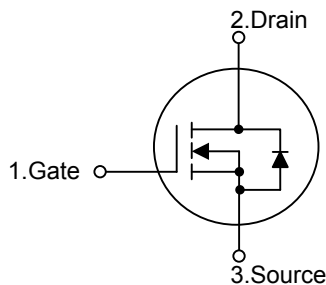
The UTC **6N70-P** is an N-channel mode power MOSFET using UTC's advanced technology to provide customers with a minimum on-state resistance, high switching speed, low gate charge and low input capacitance.

The UTC **6N70-P** is universally applied in high efficiency switch mode power supply.

FEATURES

* $R_{DS(ON)} < 1.8\Omega$ @ $V_{GS}=10V$, $I_D=3A$

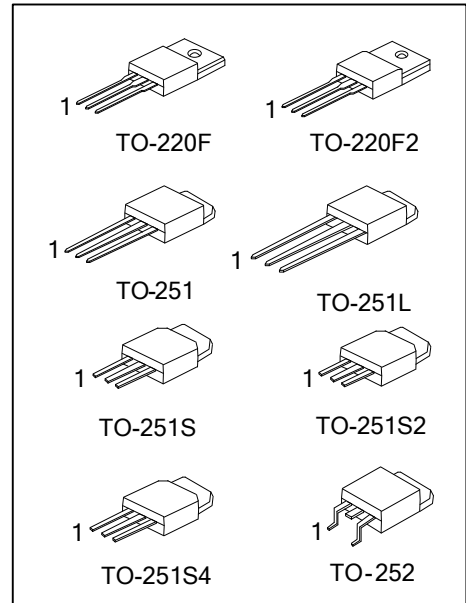
* High switching speed

SYMBOL**ORDERING INFORMATION**

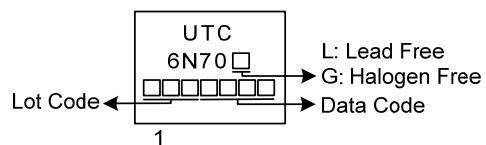
Ordering Number		Package	Pin Assignment			Packing
Lead Free	Halogen Free		1	2	3	
6N70L-TF2-T	6N70G-TF2-T	TO-220F2	G	D	S	Tube
6N70L-TF3-T	6N70G-TF3-T	TO-220F	G	D	S	Tube
6N70L-TM3-T	6N70G-TM3-T	TO-251	G	D	S	Tube
6N70L-TMA-T	6N70G-TMA-T	TO-251L	G	D	S	Tube
6N70L-TMS-T	6N70G-TMS-T	TO-251S	G	D	S	Tube
6N70L-TMS2-T	6N70G-TMS2-T	TO-251S2	G	D	S	Tube
6N70L-TMS4-T	6N70G-TMS4-T	TO-251S4	G	D	S	Tube
6N70L-TN3-R	6N70G-TN3-R	TO-252	G	D	S	Tape Reel

Note: Pin Assignment: G: Gate D: Drain S: Source

6N70L-TF2-T (1)Packing Type (2)Package Type (3)Green Package	(1) T: Tube, R: Tape Reel (2) TF2: TO-220F2, TF3: TO-220F, TM3: TO-251, TMA: TO-251L, TMS: TO-251S, TMS2: TO-251S2, TMS4: TO-251S4, TN3: TO-252 (3) L: Lead Free, G: Halogen Free and Lead Free
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■ MARKING



■ **ABSOLUTE MAXIMUM RATINGS** (unless otherwise specified)

PARAMETER			SYMBOL	RATINGS	UNIT
Drain-Source Voltage			V _{DSS}	700	V
Gate-Source Voltage (Note 2)			V _{GSS}	±30	V
Drain Current	Continuous	T _C =25°C	I _D	6	A
		T _C =100°C		3.8	A
	Pulsed		I _{DM}	24	A
Avalanche Current (Note 2)			I _{AR}	6	A
Avalanche Energy	Single Pulsed (Note 3)		E _{AS}	200	mJ
	Repetitive (Note 2)		E _{AR}	13	mJ
Peak Diode Recovery dv/dt (Note 4)			dv/dt	2.5	V/ns
Power Dissipation	TO-220F2		P _D	42	W
	TO-220F			40	
	TO-251/TO-252 TO-251L/TO-251S TO-251S2/TO-251S4			55	
	Linear Derarting Factor	TO-220F2		0.33	W/°C
TO-220F		0.32			
TO-251/TO-252 TO-251L/TO-251S TO-251S2/TO-251S4		0.44			
Junction Temperature			T _J		
Storage Temperature			T _{STG}	-55~+150	°C

Notes: 1. Absolute maximum ratings are those values beyond which the device could be permanently damaged.

Absolute maximum ratings are stress ratings only and functional device operation is not implied.

2. Repetitive Rating: Pulse width limited by maximum junction temperature

3. $L = 12\text{mH}$, $I_{AS} = 6\text{A}$, $V_{DD} = 50\text{V}$, $R_G = 27\Omega$, Starting $T_J = 25^\circ\text{C}$

4. $I_{SD} \leq 6\text{A}$, $di/dt \leq 140\text{A}/\mu\text{s}$, $V_{DD} \leq BV_{DSS}$, Starting $T_J = 25^\circ\text{C}$

■ **THERMAL DATA**

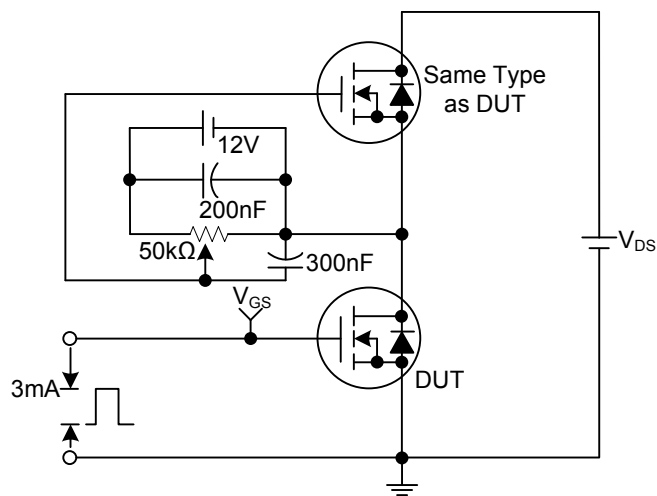
PARAMETER		SYMBOL	RATINGS	UNIT
Junction to Ambient	TO-220F/TO-220F2	θ_{JA}	62.5	$^\circ\text{C}/\text{W}$
	TO-251/TO-252 TO-251L/TO-251S TO-251S2/TO-251S4		110	$^\circ\text{C}/\text{W}$
	TO-220F2		2.9	$^\circ\text{C}/\text{W}$
	TO-220F		3.1	$^\circ\text{C}/\text{W}$
Junction to Case	TO-251/TO-252 TO-251L/TO-251S TO-251S2/TO-251S4	θ_{JC}	2.27	$^\circ\text{C}/\text{W}$
	TO-220F2		2.9	$^\circ\text{C}/\text{W}$
	TO-220F		3.1	$^\circ\text{C}/\text{W}$
	TO-251/TO-252 TO-251L/TO-251S TO-251S2/TO-251S4		2.27	$^\circ\text{C}/\text{W}$

■ **ELECTRICAL CHARACTERISTICS** ($T_C=25^\circ\text{C}$, unless otherwise specified)

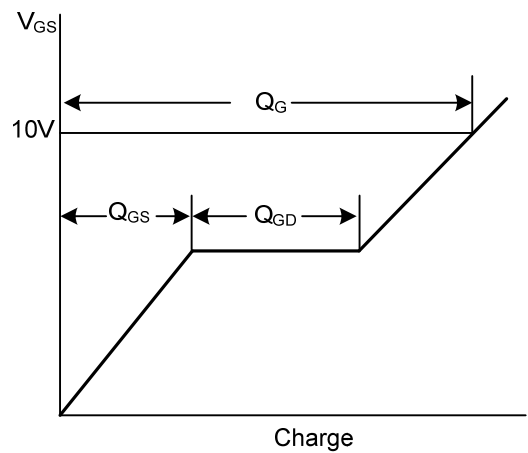
PARAMETER		SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
OFF CHARACTERISTICS							
Drain-Source Breakdown Voltage		BV _{DSS}	I _D =250μA, V _{GS} =0V	700			V
Breakdown Voltage Temperature Coefficient		ΔBV _{DSS} /ΔT _J	I _D =250μA		0.79		V/°C
Drain-Source Leakage Current		I _{DSS}	V _{DS} =700V			25	μA
			V _{DS} =560V, T _C =125°C			250	μA
Gate-Source Leakage Current	Forward	I _{GSS}	V _{GS} =+30V, V _{DS} =0V			+100	nA
	Reverse		V _{GS} =-30V, V _{DS} =0V			-100	nA
ON CHARACTERISTICS							
Gate Threshold Voltage		V _{GS(TH)}	V _{DS} =V _{GS} , I _D =250μA	2.0		4.0	V
Static Drain-Source On-State Resistance		R _{DS(ON)}	V _{GS} =10V, I _D =3A (Note 1)		1.6	1.8	Ω
DYNAMIC PARAMETERS							
Input Capacitance		C _{ISS}	V _{GS} =0V, V _{DS} =25V, f=1.0MHz (Note 1, 2)		810	1000	pF
Output Capacitance		C _{OSS}			95	135	pF
Reverse Transfer Capacitance		C _{RSS}			15	25	pF
SWITCHING PARAMETERS							
Turn-ON Delay Time		t _{D(ON)}	V _{DS} =30V, I _D =0.5A, R _G =2.5Ω		57	84	ns
Rise Time		t _R			64	90	ns
Turn-OFF Delay Time		t _{D(OFF)}			180	220	ns
Fall-Time		t _F			68	100	ns
Total Gate Charge		Q _G	V _{GS} =10V, V _{DS} =50V, I _D =1.3A (Note 1, 2)		25	35	nC
Gate to Source Charge		Q _{GS}			6.5		nC
Gate to Drain Charge		Q _{GD}			6.0		nC
SOURCE- DRAIN DIODE RATINGS AND CHARACTERISTICS							
Maximum Body-Diode Continuous Current		I _S	Integral reverse pn-diode in the MOSFET			6	A
Maximum Body-Diode Pulsed Current (Note 3)		I _{SM}				24	A
Drain-Source Diode Forward Voltage (Note 2)		V _{SD}	I _S =6A, V _{GS} =0V, T _J = 25°C			1.4	V

Notes: 1. Pulse Test: Pulse width $\leq 250\mu\text{s}$, Duty cycle $\leq 2\%$
 2. Essentially independent of operating temperature
 3. Repetitive Rating: Pulse width limited by maximum junction temperature

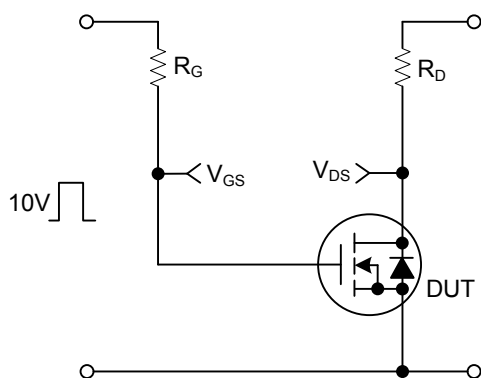
■ TEST CIRCUITS AND WAVEFORMS



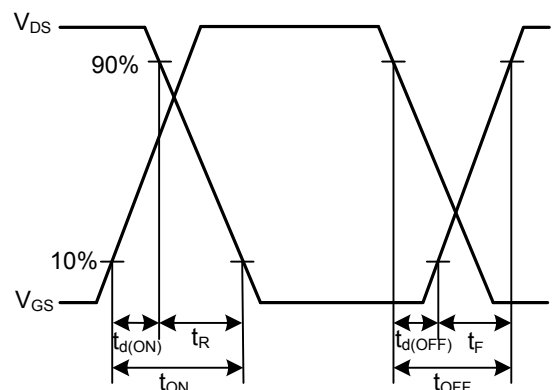
Gate Charge Test Circuit



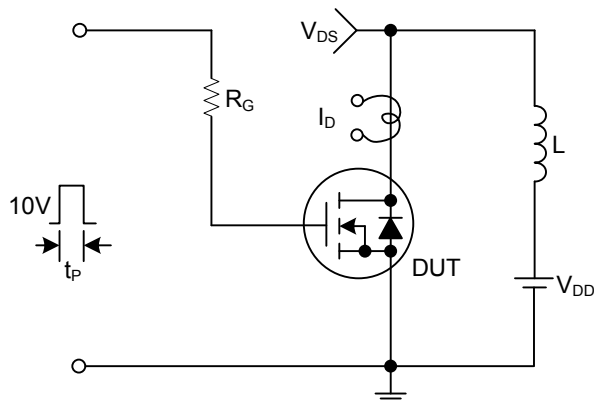
Gate Charge Waveforms



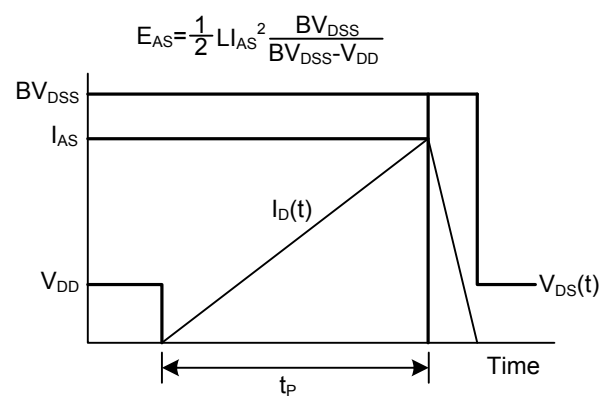
Resistive Switching Test Circuit



Resistive Switching Waveforms

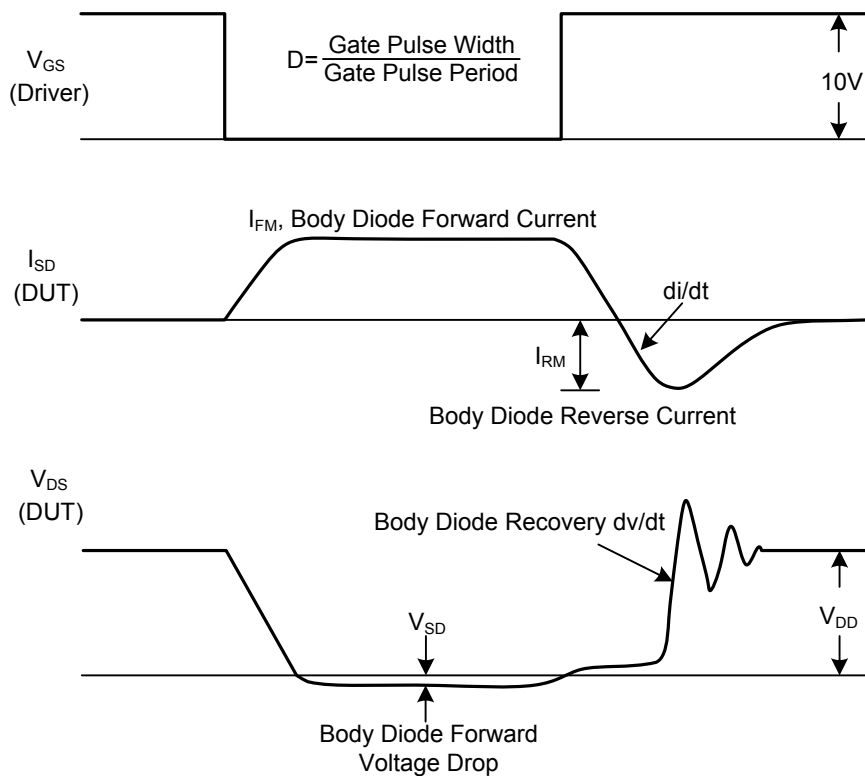
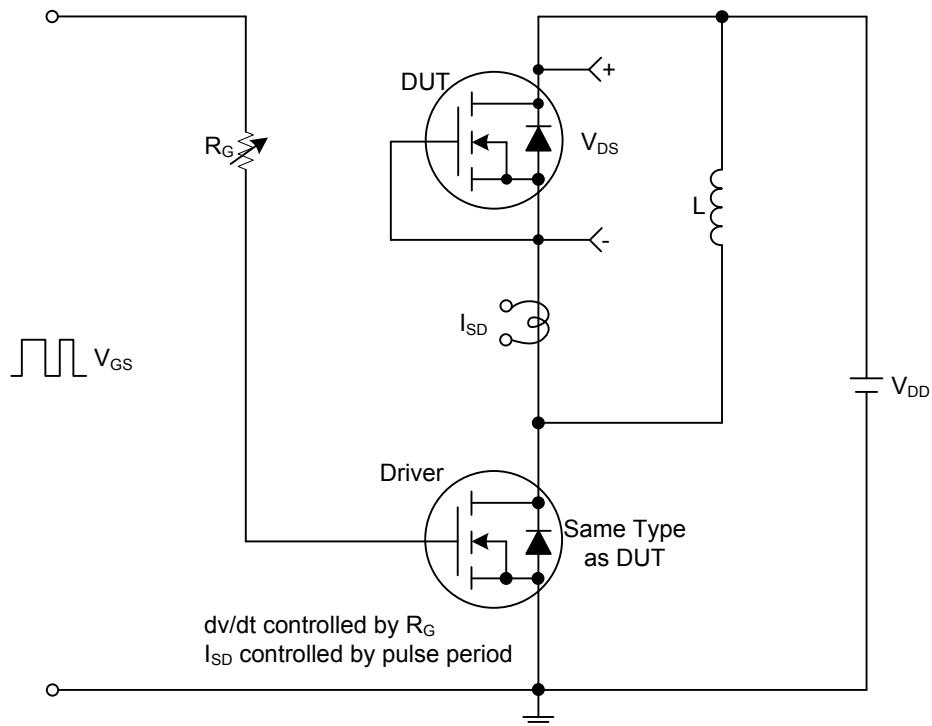


Unclamped Inductive Switching Test Circuit



Unclamped Inductive Switching Waveforms

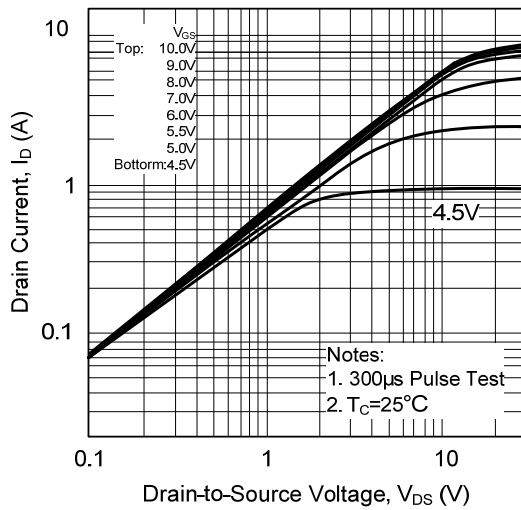
■ TEST CIRCUITS AND WAVEFORMS(Cont.)



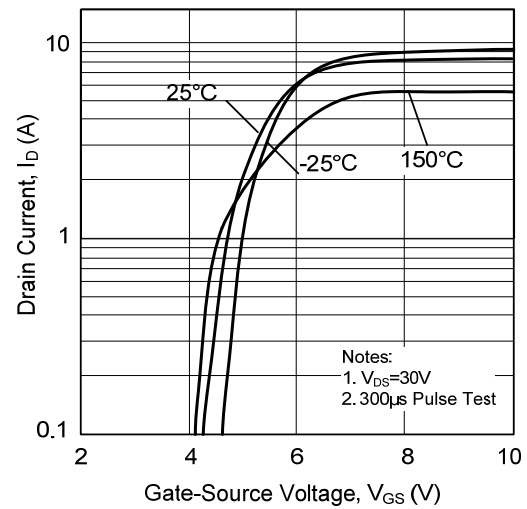
Peak Diode Recovery dv/dt Test Circuit and Waveforms

TYPICAL CHARACTERISTICS

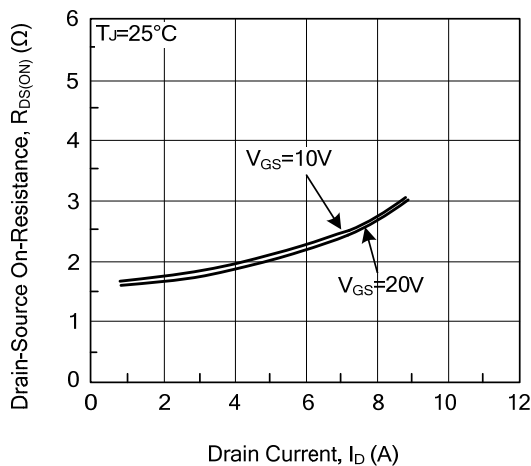
On-State Characteristics



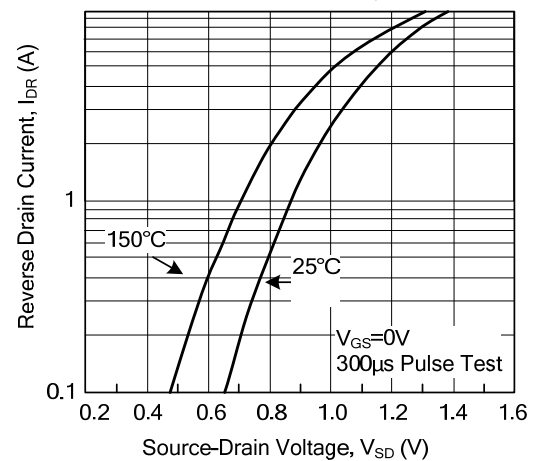
Transfer Characteristics



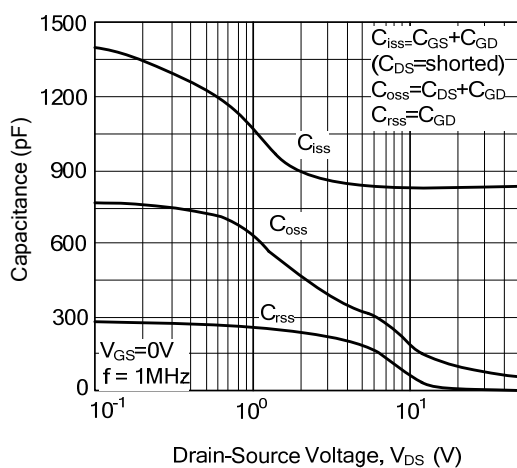
On-Resistance Variation vs. Drain Current and Gate Voltage



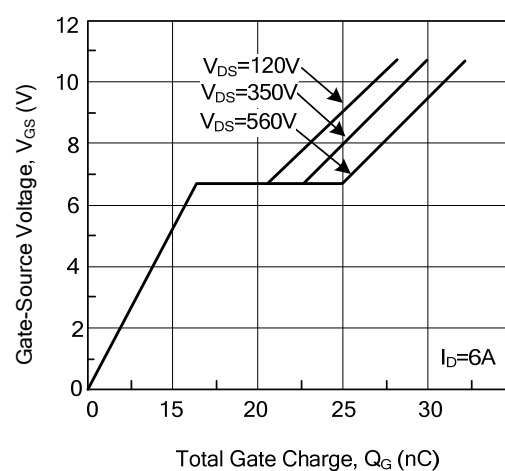
Body Diode Forward Voltage Variation vs. Source Current and Temperature



Capacitance vs. Drain-Source Voltage

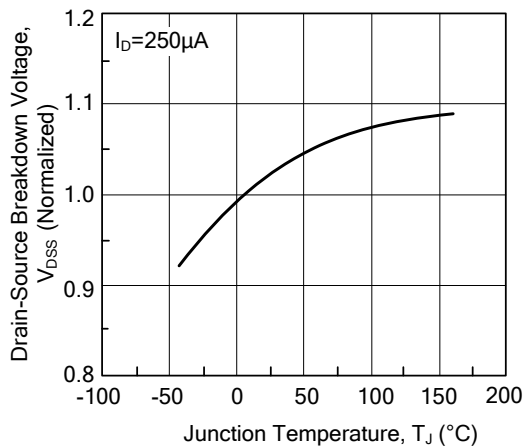


Gate Charge vs. Gate Charge Voltage

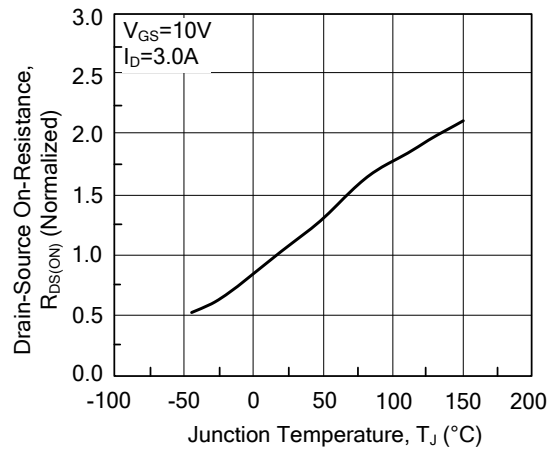


■ TYPICAL CHARACTERISTICS(C)

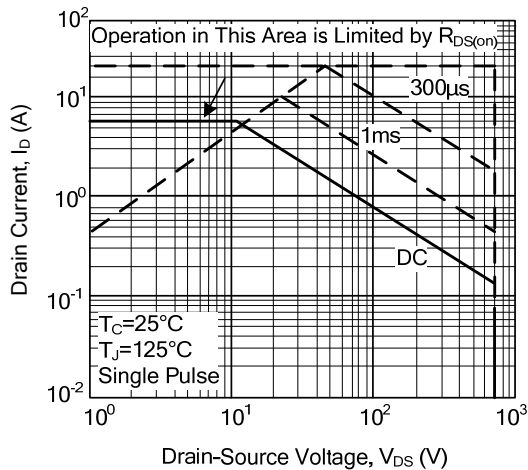
Breakdown Voltage vs. Temperature



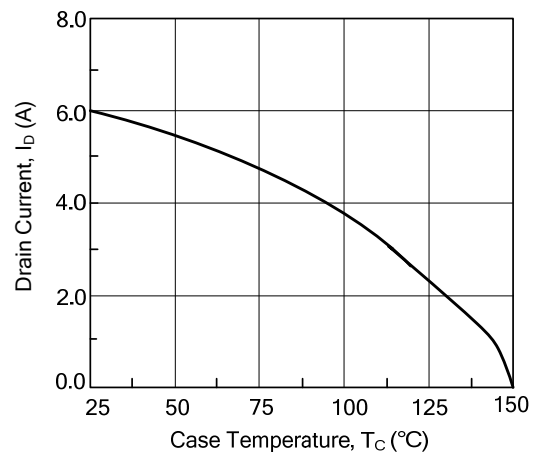
On-Resistance vs. Temperature



Max. Safe Operating Area



Max. Drain Current vs. Case Temperature



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