



1N70

Power MOSFET

1.2A, 700V N-CHANNEL POWER MOSFET

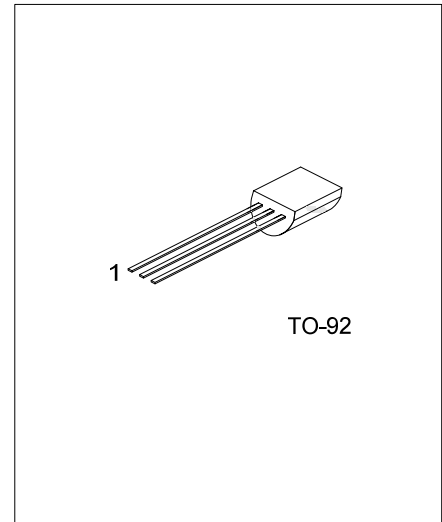
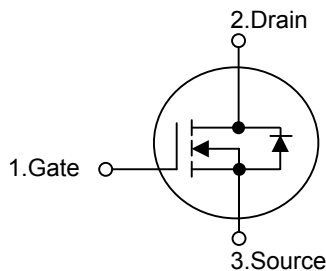
DESCRIPTION

The UTC **1N70** is a high voltage MOSFET and is designed to have better characteristics, such as fast switching time, low gate charge, low on-state resistance and have a high rugged avalanche characteristics. This power MOSFET is usually used at high speed switching applications in power supplies, PWM motor controls, high efficient DC to DC converters and bridge circuits.

FEATURES

- * $R_{DS(ON)} = 13.5\Omega @ V_{GS} = 10V$.
- * Ultra Low gate charge (typical 5.0nC)
- * Low reverse transfer capacitance (C_{RSS} = typical 3.0 pF)
- * Fast switching capability
- * Avalanche energy specified
- * Improved dv/dt capability, high ruggedness

SYMBOL



ORDERING INFORMATION

Ordering Number		Package	Pin Assignment			Packing
Lead Free	Halogen Free		1	2	3	
1N70L-T92-B	1N70G-T92-B	TO-92	G	D	S	Tape Box
1N70L-T92-K	1N70G-T92-K	TO-92	G	D	S	Bulk
1N70L-T92-R	1N70G-T92-R	TO-92	G	D	S	Tape Reel

1N70L-T92-B (1)Packing Type (2)Package Type (3)Lead Free		(1) B: Tape Box, K: Bulk, T: Tube, R: Tape Reel (2) T92: TO-92 (3) G: Halogen Free, L: Lead Free
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■ ABSOLUTE MAXIMUM RATINGS ($T_C = 25^\circ\text{C}$, unless otherwise specified)

PARAMETER		SYMBOL	RATINGS	UNIT
Drain-Source Voltage		V_{DSS}	700	V
Gate-Source Voltage		V_{GSS}	± 30	V
Avalanche Current (Note 2)		I_{AR}	1.2	A
Continuous Drain Current		I_D	1.2	A
Pulsed Drain Current (Note 2)		I_{DM}	4.8	A
Avalanche Energy	Single Pulsed (Note 3)	E_{AS}	50	mJ
	Repetitive (Note 2)	E_{AR}	4.0	mJ
Peak Diode Recovery dv/dt (Note 4)		dv/dt	4.5	V/ns
Power Dissipation		P_D	3	W
Junction Temperature		T_J	+150	$^\circ\text{C}$
Operating Temperature		T_{OPR}	-55 ~ +150	$^\circ\text{C}$
Storage Temperature		T_{STG}	-55 ~ +150	$^\circ\text{C}$

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. $L = 60\text{mH}$, $I_{AS} = 1\text{A}$, $V_{DD} = 50\text{V}$, $R_G = 25\Omega$, Starting $T_J = 25^\circ\text{C}$

4. $I_{SD} \leq 1.2\text{A}$, $di/dt \leq 200\text{A}/\mu\text{s}$, $V_{DD} \leq BV_{DSS}$, Starting $T_J = 25^\circ\text{C}$

■ THERMAL DATA

PARAMETER	SYMBOL	RATINGS	UNIT
Junction to Ambient	θ_{JA}	79	$^\circ\text{C}/\text{W}$
Junction to Case	θ_{JC}	29	$^\circ\text{C}/\text{W}$

■ ELECTRICAL CHARACTERISTICS (T_C=25°C, unless otherwise specified.)

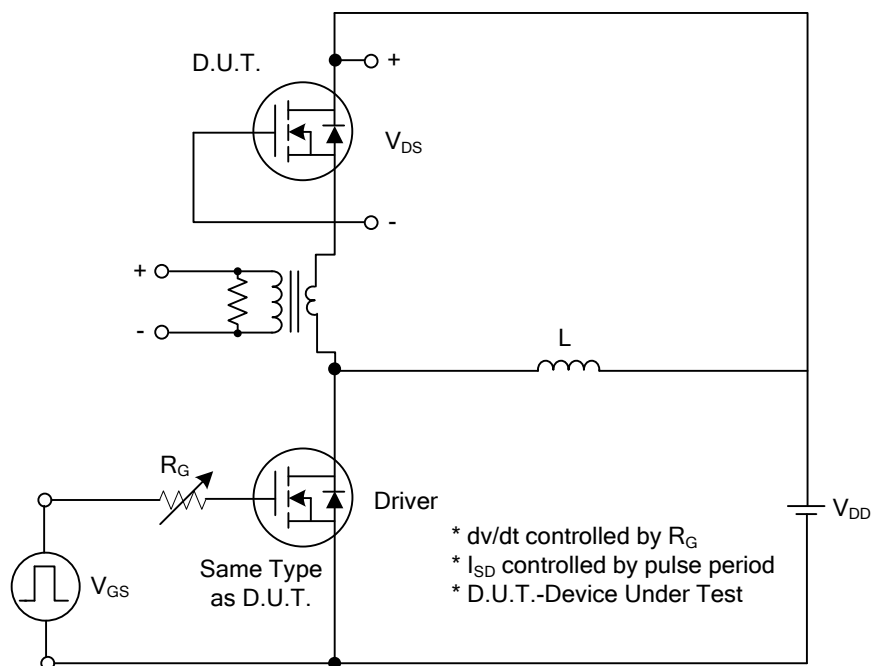
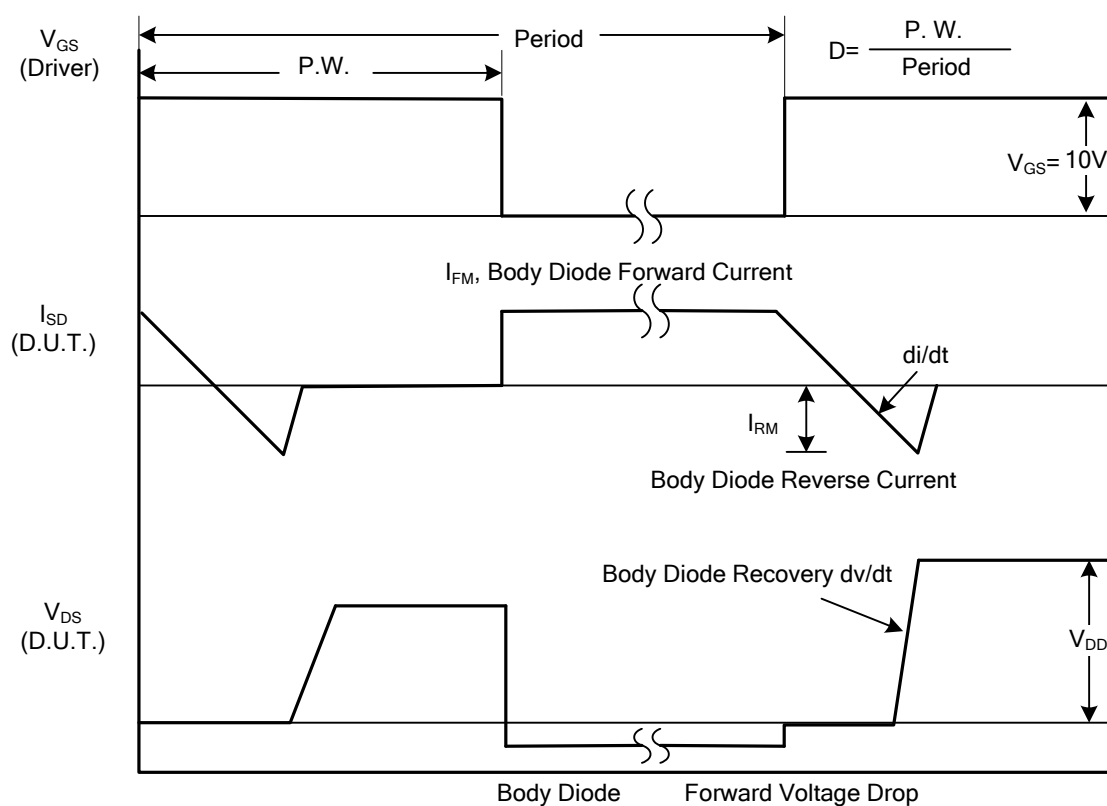
PARAMETER		SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
OFF CHARACTERISTICS							
Drain-Source Breakdown Voltage		BV _{DSS}	V _{GS} = 0V, I _D = 250μA	700			V
Drain-Source Leakage Current		I _{DSS}	V _{DS} = 700V, V _{GS} = 0V			10	μA
Gate-Source Leakage Current	Forward	I _{GSS}	V _{GS} = 30V, V _{DS} = 0V			100	nA
	Reverse		V _{GS} = -30V, V _{DS} = 0V			-100	nA
Breakdown Voltage Temperature Coefficient		ΔBV _{DSS} /ΔT _J	I _D = 250μA		0.4		V/°C
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 = 0.6A		9.3	13.5	Ω
DYNAMIC CHARACTERISTICS							
Input Capacitance		C _{ISS}	V _{DS} =25V, V _{GS} =0V, f=1MHz		120	150	pF
Output Capacitance		C _{OSS}			20	25	pF
Reverse Transfer Capacitance		C _{RSS}			3.0	4.0	pF
SWITCHING CHARACTERISTICS							
Turn-On Delay Time		t _{D(ON)}	V _{DD} =350V, I _D =1.2A, R _G =50Ω (Note 2,3)		5	20	ns
Turn-On Rise Time		t _R			25	60	ns
Turn-Off Delay Time		t _{D(OFF)}			7	25	ns
Turn-Off Fall Time		t _F			25	60	ns
Total Gate Charge		Q _G	V _{DS} =560V, V _{GS} =10V, I _D =1.2A (Note 2,3)		5.0	6.0	nC
Gate-Source Charge		Q _{GS}			1.0		nC
Gate-Drain Charge		Q _{GD}			2.6		nC
SOURCE-DRAIN DIODE RATINGS AND CHARACTERISTICS							
Drain-Source Diode Forward Voltage		V _{SD}	V _{GS} =0V, I _S = 1.2A			1.4	V
Maximum Continuous Drain-Source Diode Forward Current		I _S				1.2	A
Maximum Pulsed Drain-Source Diode Forward Current		I _{SM}				4.8	A
Reverse Recovery Time		t _{rr}	V _{GS} =0V, I _S = 1.2A		160		ns
Reverse Recovery Charge		Q _{RR}	dI _F /dt = 100A/μs (Note1)		0.3		μC

Notes: 1. Repetitive Rating: Pulse width limited by maximum junction temperature

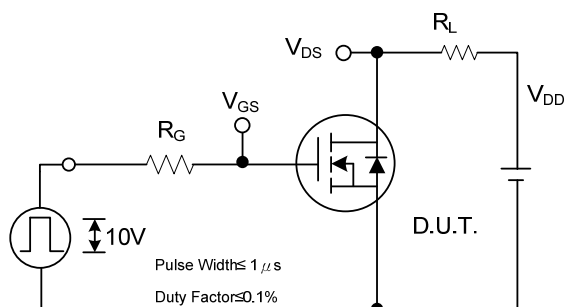
2. Pulse Test: Pulse Width ≤300μs, Duty Cycle≤2%

3. Essentially Independent of Operating Temperature

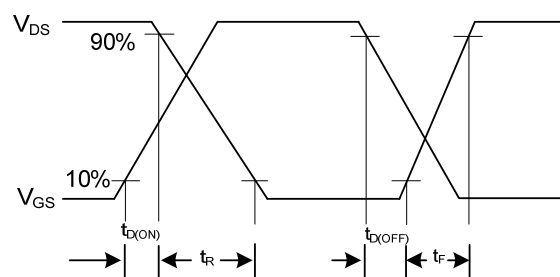
TEST CIRCUITS AND WAVEFORMS

Peak Diode Recovery dv/dt Test CircuitPeak Diode Recovery dv/dt Waveforms

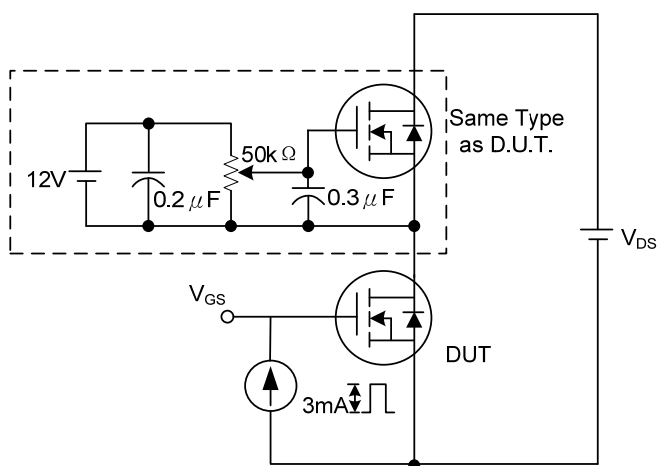
■ TEST CIRCUITS AND WAVEFORMS (Cont.)



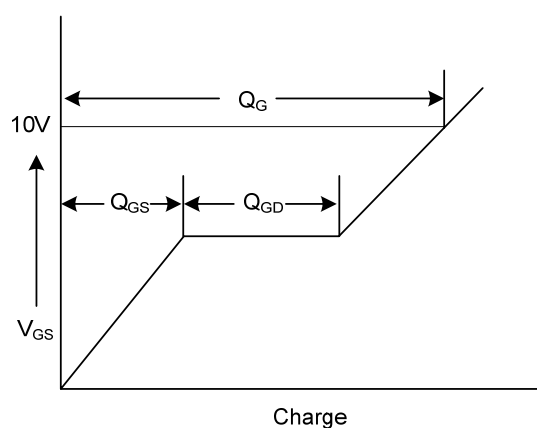
Switching Test Circuit



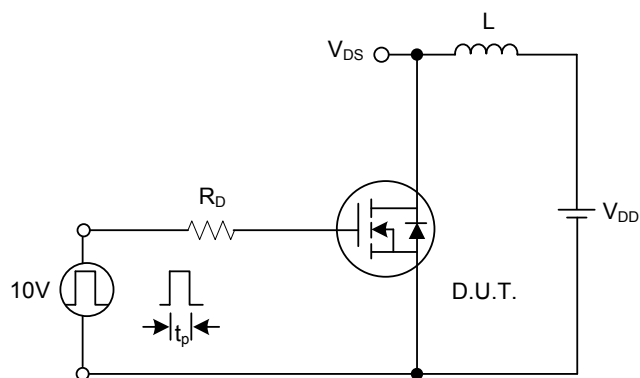
Switching Waveforms



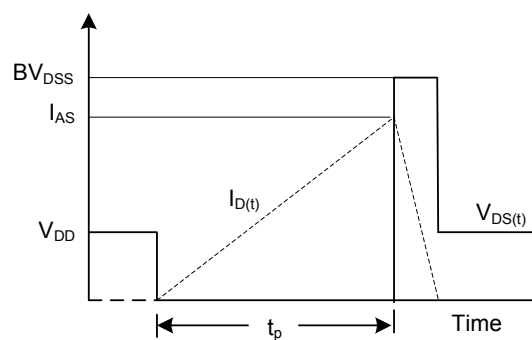
Gate Charge Test Circuit



Gate Charge Waveform



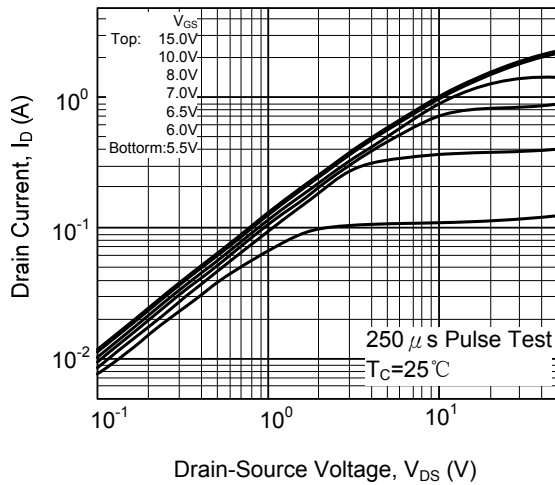
Unclamped Inductive Switching Test Circuit



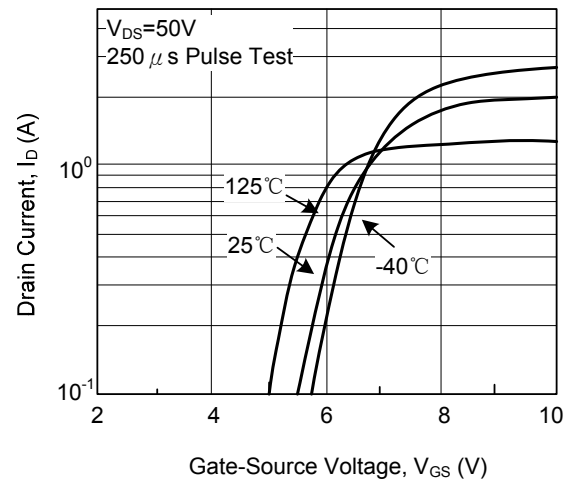
Unclamped Inductive Switching Waveforms

TYPICAL CHARACTERISTICS

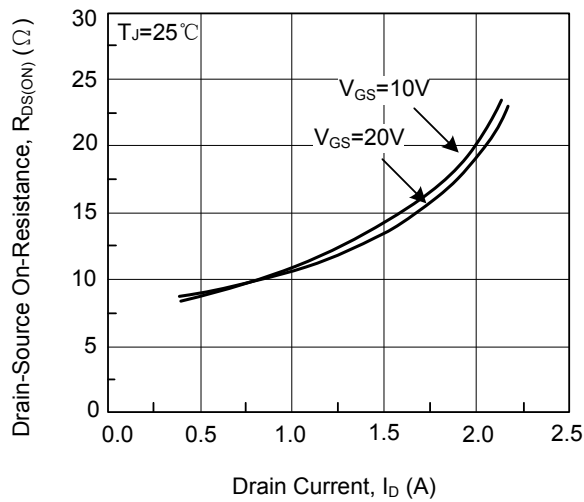
Output Characteristics



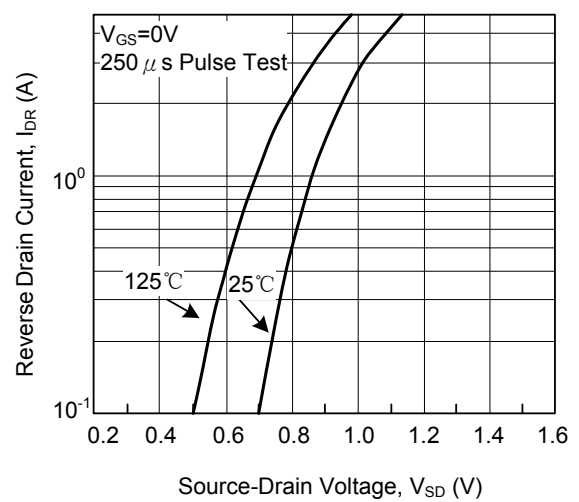
Transfer Characteristics



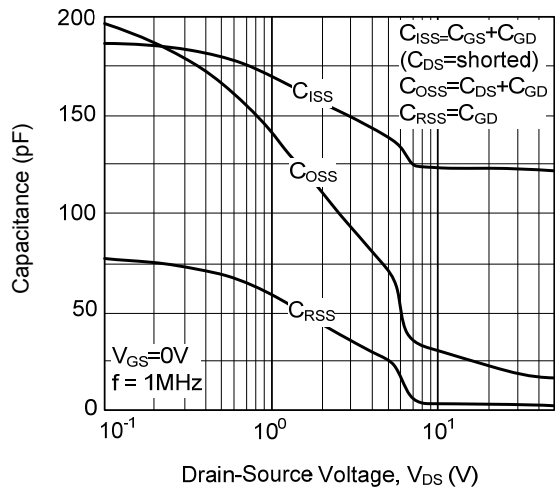
On-Resistance vs. Drain Current



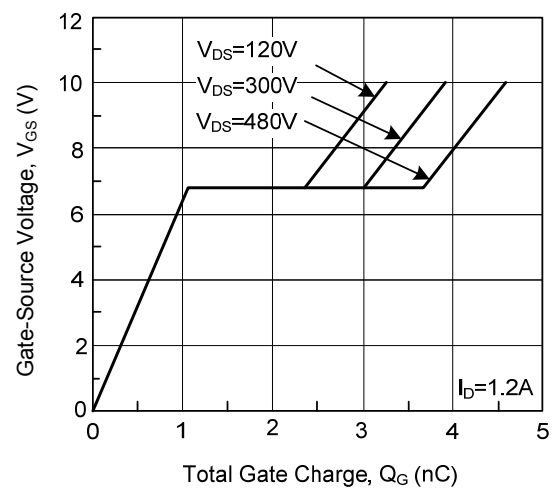
Source- Drain Diode Forward Voltage



Capacitance vs. Drain-Source Voltage

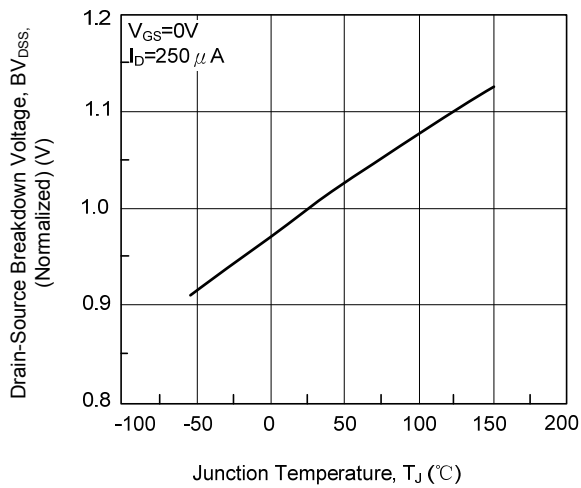


Gate Charge vs. Gate-Source Voltage

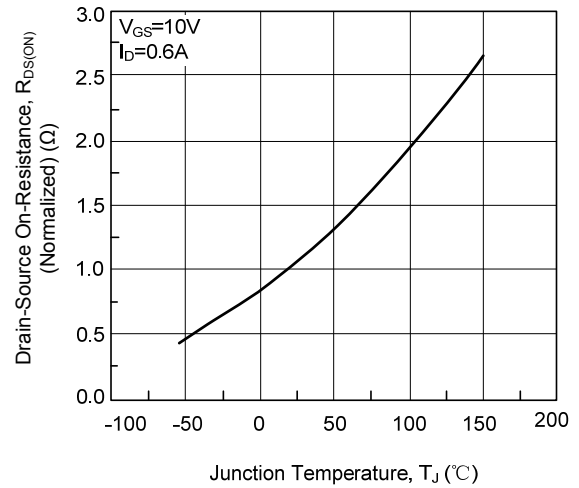


TYPICAL CHARACTERISTICS(Cont.)

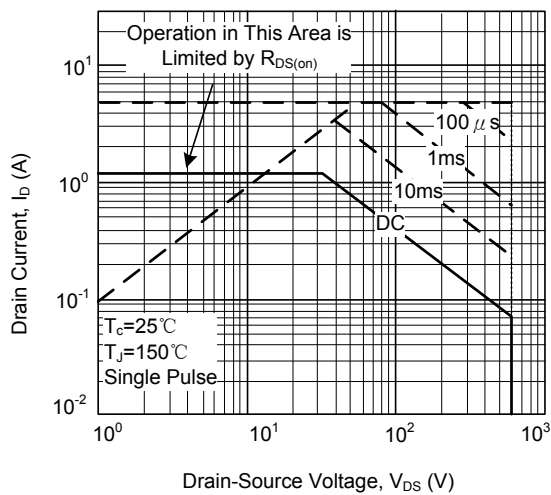
Breakdown Voltage vs. Temperature



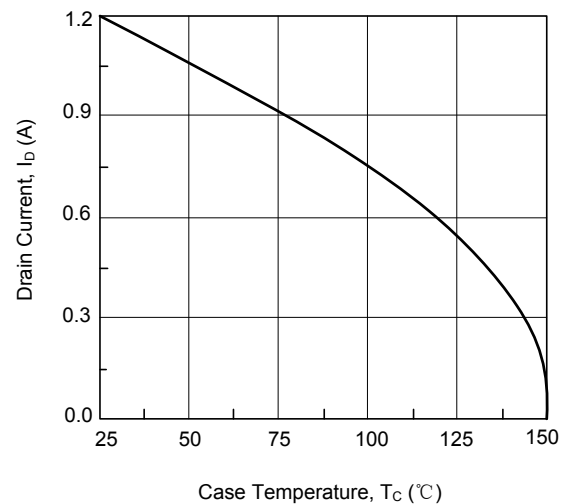
On-Resistance vs. Temperature



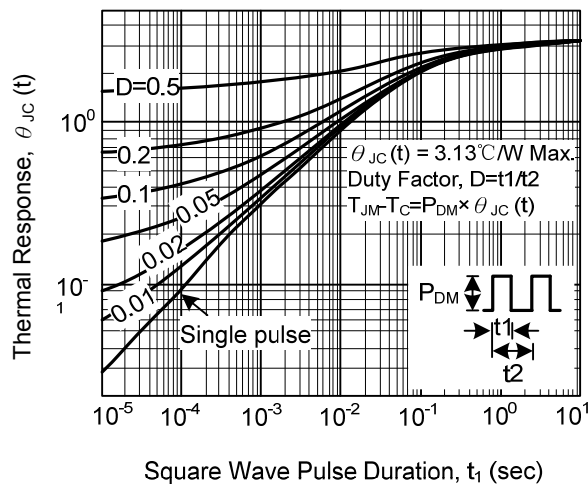
Max. Safe Operating Area



Max. Drain Current vs. Case Temperature



Thermal Response



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