

2 Amps, 600 Volts N-CHANNEL MOSFET

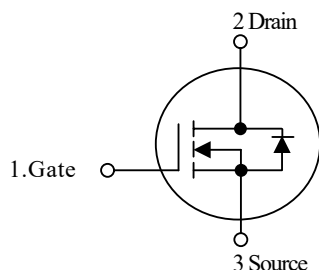
DESCRIPTION

The FTK 2N60 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

- * $R_{DS(ON)} = 4.8\Omega @ V_{GS} = 10V$
- * Ultra Low gate charge (typical 1.5nC)
- * Low reverse transfer capacitance ($C_{RSS} =$ typical 5.0 pF)
- * Fast switching capability
- * Avalanche energy specified
- * Improved dv/dt capability, high ruggedness

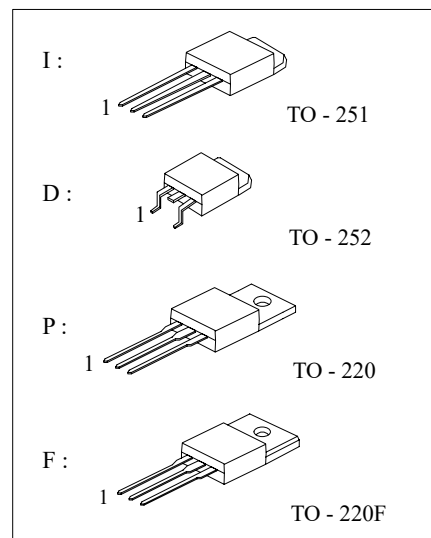
SYMBOL



ORDERING INFORMATION

Ordering Number	Package	Pin Assignment			Packing
		1	2	3	
FTK2N60P	TO-220	G	D	S	Tube
FTK2N60F	TO-220F	G	D	S	Tube
FTK2N60I	TO-251	G	D	S	Tube
FTK2N60D	TO-252	G	D	S	Tape Reel

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





FTK2N60P / F / D / I

■ ABSOLUTE MAXIMUM RATINGS (T_C = 25 °C, unless otherwise specified)

PARAMET		SYMBOL	RATINGS	UNIT
Drain-Source Voltage		V _{DSS}	600	V
Gate-Source Voltage		V _{GSS}	±30	V
Avalanche Current (Note 2)		I _{AR}	2.0	A
Drain Current Continuous	T _C = 25°C	I _D	2.0	A
	T _C = 100°C		1.2	A
Drain Current Pulsed (Note 2)		I _{DP}	8.0	A
Avalanche Energy	Repetitive(Note 2)	E _{AR}	5.4	mJ
	Single Pulse(Note 3)	E _{AS}	131	mJ
Peak Diode Recovery		dv/dt	4.5	V/ns
Total Power Dissipation (TO-251/252/TO-220/TO-220F)	T _C = 25°C	P _D	45/45/62.5/31	W
	Derate above 25°C		0.36/0.36/0.5/0.25	W / °C
Junction Temperature		T _J	+150	°C
Storage Temperature		T _{STG}	-55 ~ +150	°C

Note: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=64mH, I_{AS}=2.0A, V_{DD}=50V, R_G=25 Ω, Starting T_J = 25°C
4. I_{SD} ≤ 2.0A, di/dt ≤ 300A/μs, V_{DD} ≤ BVDSS, Starting T_J = 25°C

■ THERMAL DATA

PARAMETER	PACKAGE	SYMBOL	RATINGS	UNIT
Thermal Resistance Junction-Ambient	TO-251	θ _{JA}	112	°C / W
	TO-252		112	
	TO-220		54	
	TO-220F		54	
Thermal Resistance Junction-Case	TO-251	θ _{Jc}	2.8	
	TO-252		2.8	
	TO-220		2	
	TO-220F		4	

■ ELECTRICAL CHARACTERISTICS (T_J = 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	600			V
Zero Gate Voltage Drain Current	I _{DSS}	V _{DS} = 600V, V _{GS} = 0V			10	μA
		V _{DS} = 480V, T _C = 125°C			10	μA
Gate-Body Leakage Current	I _{GSS}	V _{GS} = 30V, V _{DS} = 0V			100	nA
		V _{GS} = -30V, V _{DS} = 0V			-100	nA
Breakdown Voltage Temperature Coefficient	ΔBV _{DSS} /ΔT _J	I _D = 250 μA		0.7		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-Resistance	R _{DS(ON)}	V _{GS} = 10V, I _D = 1A		4.8	6	Ω
DYNAMIC CHARACTERISTICS						
Input Capacitance	C _{ISS}	V _{DS} = 25V, V _{GS} = 0V, f = 1MHz		350		pF
Output Capacitance	C _{OSS}			40		pF
Reverse Transfer Capacitance	C _{RSS}			5		pF



FTK2N60P / F / D / I

■ ELECTRICAL CHARACTERISTICS (T_J = 25°C, unless Otherwise specified.)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
SWITCHING CHARACTERISTICS						
Turn-On Delay Time	t _{D(ON)}	V _{DD} =300V, I _D =2.0A, R _G =25Ω (Note 1,2)		10		ns
Rise Time	t _R			30		ns
Turn-Off Delay Time	t _{D(OFF)}			30		ns
Fall Time	t _F			30		ns
Total Gate Charge	Q _G	V _{DS} =480V, V _{GS} =10V, I _D =2.0A (Note 1, 2)		10		nC
Gate-Source Charge	Q _{GS}			1.5		nC
Gate-Drain Charge	Q _{GD}			5		nC
DRAIN-SOURCE DIODE CHARACTERISTICS						
Drain-Source Diode Forward Voltage	V _{SD}	V _{GS} = 0 V, I _{SD} = 2.0 A			1.5	V
Continuous Drain-Source Current	I _{SD}				2.0	A
Pulsed Drain-Source Current	I _{SM}				8.0	A
Reverse Recovery Time	t _{RR}	V _{GS} = 0 V, I _{SD} = 2.0A, di/dt = 100 A/μs (Note1)		250		ns
Reverse Recovery Charge	Q _{RR}				1.0	

Note: 1. Pulse Test: Pulse Width ≤300μs, Duty Cycle≤2%

2. Essentially Independent of Operating Temperature

■ TEST CIRCUITS AND WAVEFORMS

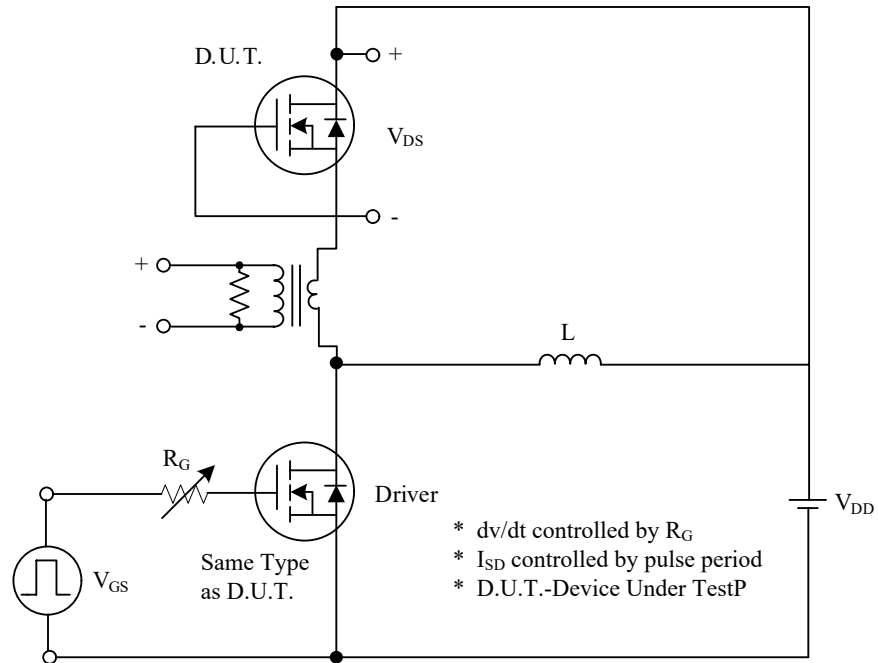


Fig. 1A Peak Diode Recovery dv/dt Test Circuit

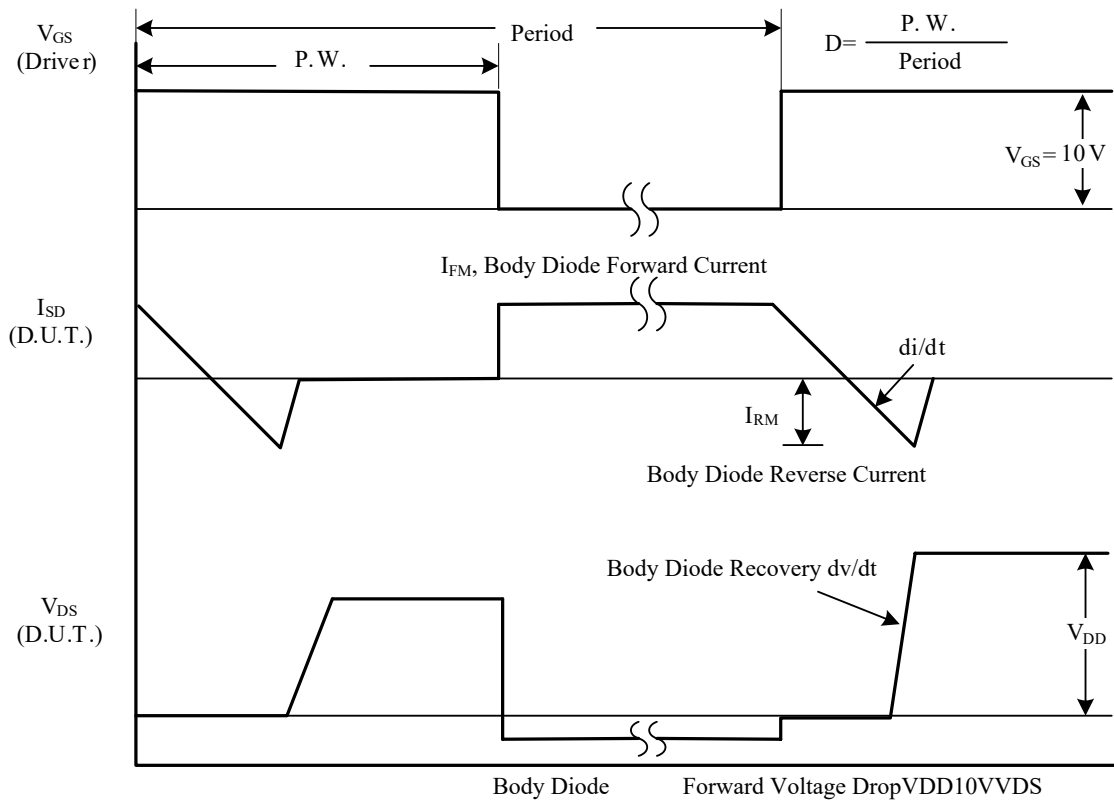


Fig. 1B Peak Diode Recovery dv/dt Waveforms

TEST CIRCUITS AND WAVEFORMS (Cont.)

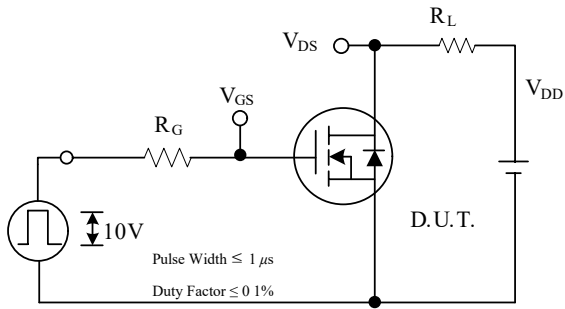


Fig. 2A Switching Test Circuit

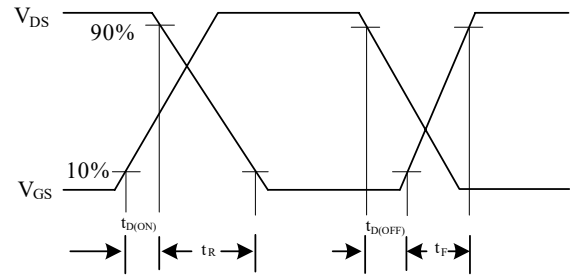


Fig. 2B Switching Waveforms

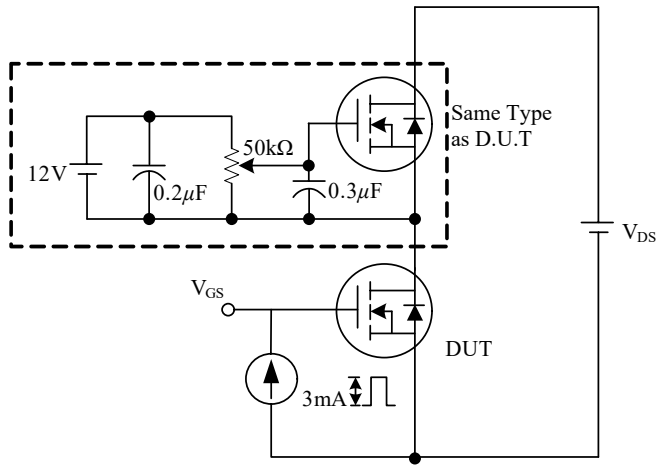


Fig. 3A Gate Charge Test Circuit

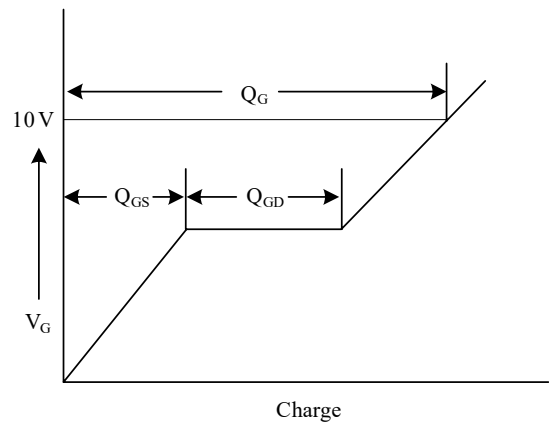


Fig. 3B Gate Charge Waveform

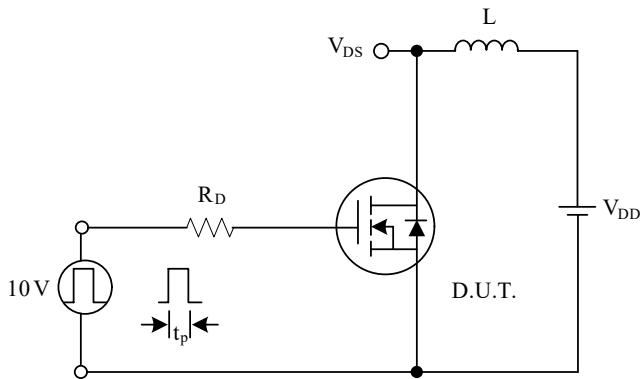


Fig. 4A Unclamped Inductive Switching Test Circuit

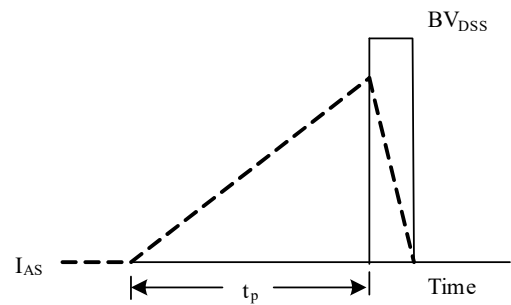
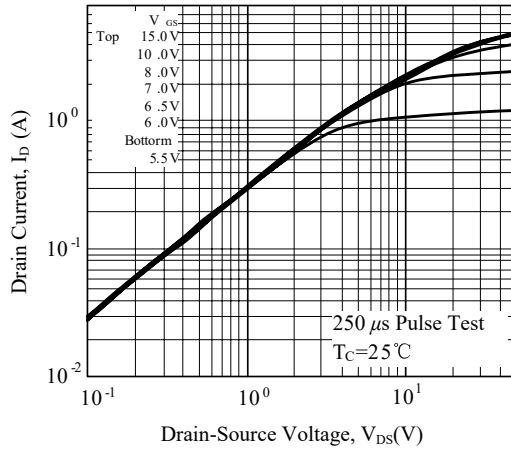


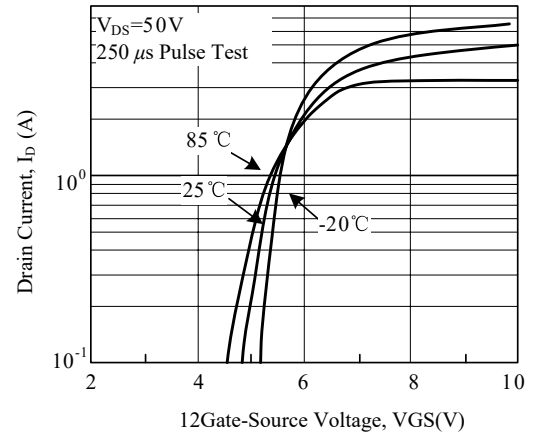
Fig. 4B Unclamped Inductive Switching Waveforms

TYPICAL CHARACTERISTICS

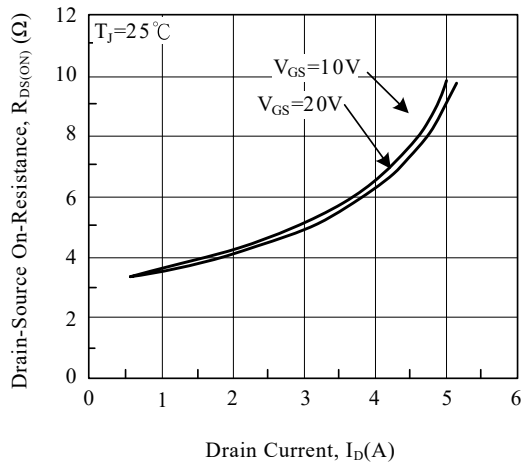
On-Region Characteristics



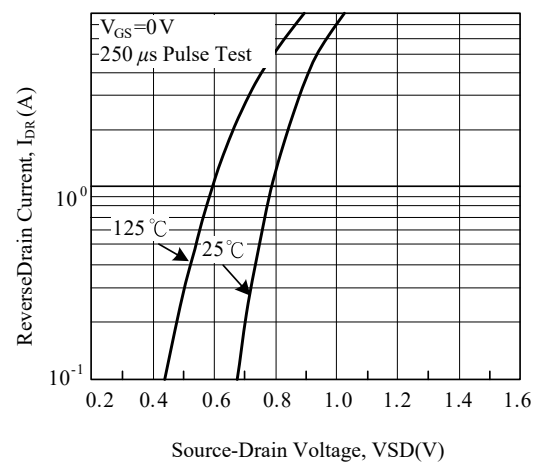
Transfer Characteristics



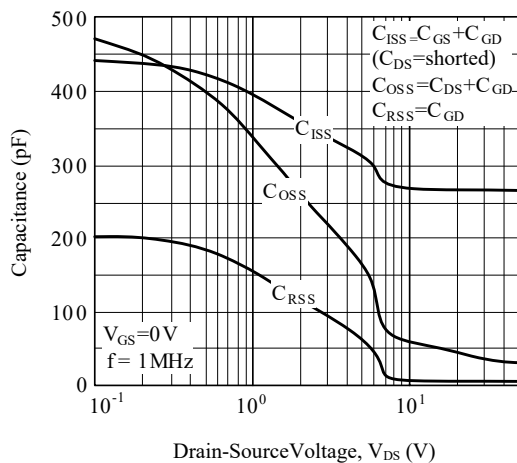
On-Resistance Variation vs. Drain Current and Gate Voltage



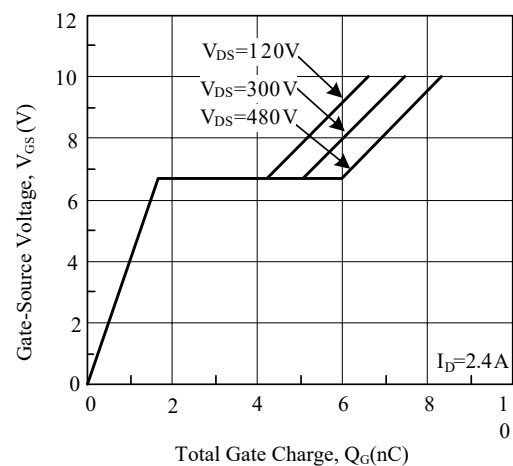
Body Diode Forward Voltage Variation vs. Source Current and Temperature



Capacitance vs. Drain-Source Voltage

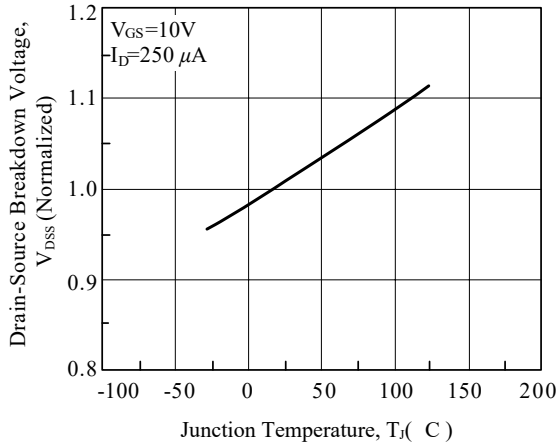


Gate Charge vs. Gate Charge Voltage

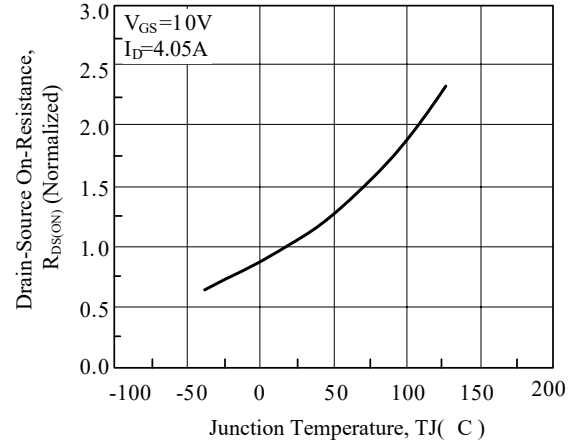


TYPICAL CHARACTERISTICS(Cont.)

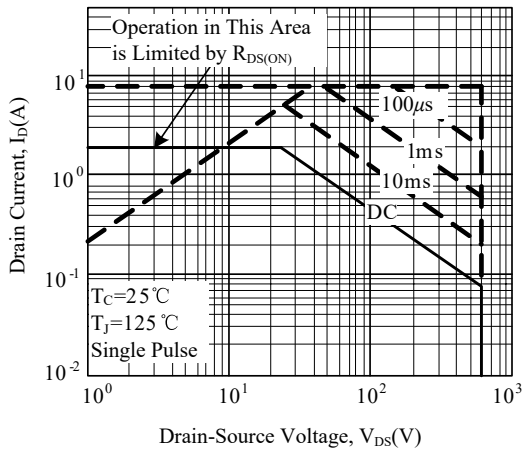
Breakdown Voltage vs Temperature



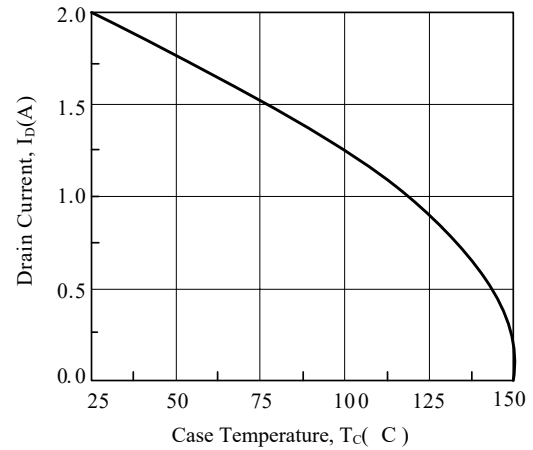
On-Resistance vs. Temperature



Max. Safe Operating Area



Max. Drain Current vs. Case Temperature



Thermal Response (TO-220)

