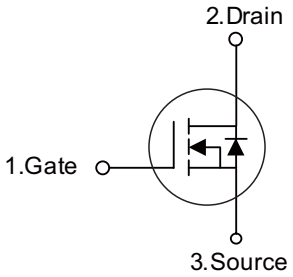
■ PRODUCT CHARACTERISTICS

VDSS	650V
R_{DS} (on)typ(@$_{VGS}$ =10 V)	0.4Ω
Qg@type	54nC
ID	20A

Symbol



■ APPLICATIONS

- High efficiency switch mode power supplies
- Electronic ballasts
- LED power supply

■ FEATURES

* High Switching Speed
* 100% Avalanche Tested

TO-220

TO-220F

■ ORDER INFORMATION

Order codes		Package	Packing
Halogen-Free	Halogen		
N/A	MOT20N65HF	TO-220F	50 pieces/Tube
N/A	MOT20N65A	TO-220	50 pieces/Tube

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

PARAMETER		SYMBOL	RATINGS	UNIT
Drain-Source Voltage		V_{DSS}	650	V
Gate-Source Voltage		V_{GSS}	±30	V
Drain Current	Continuous	I_D	20	A
	Pulsed (Note 2)	I_{DM}	40	A
Avalanche Energy	Single Pulsed (Note 3)	E_{AS}	562	mJ
Peak Diode Recovery dv/dt (Note 4)		dv/dt	2.46	V/ns
Power Dissipation	TO-220	P_D	270	W
	TO-220F		65	W
Junction Temperature		T_J	+150	°C
Storage Temperature		T_{STG}	-55 ~ +150	°C

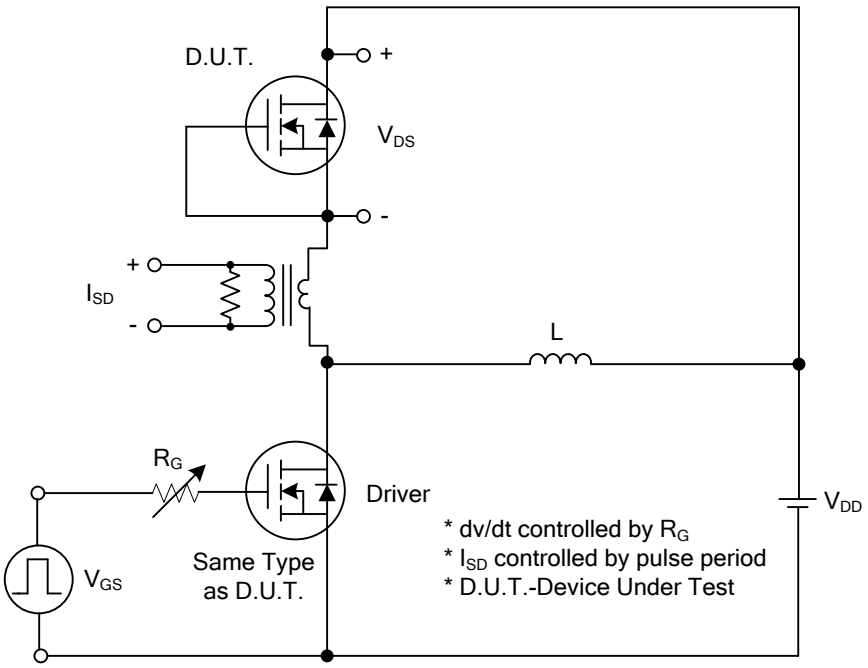
Notes: 1. Absolute maximum ratings are those values beyond which the device could be permanently damaged. Absolute maximum ratings are stress ratings only and functional device operation is not implied.
2. Repetitive Rating: Pulse width limited by maximum junction temperature.
3. L = 10mH, I_{AS} = 10.5A, V_{DD} = 50V, R_G = 25 Ω Starting T_J = 25°C
4. I_{SD} ≤ 20A, di/dt ≤200A/μs, V_{DD} ≤BV_{DSS}, Starting T_J = 25°C

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

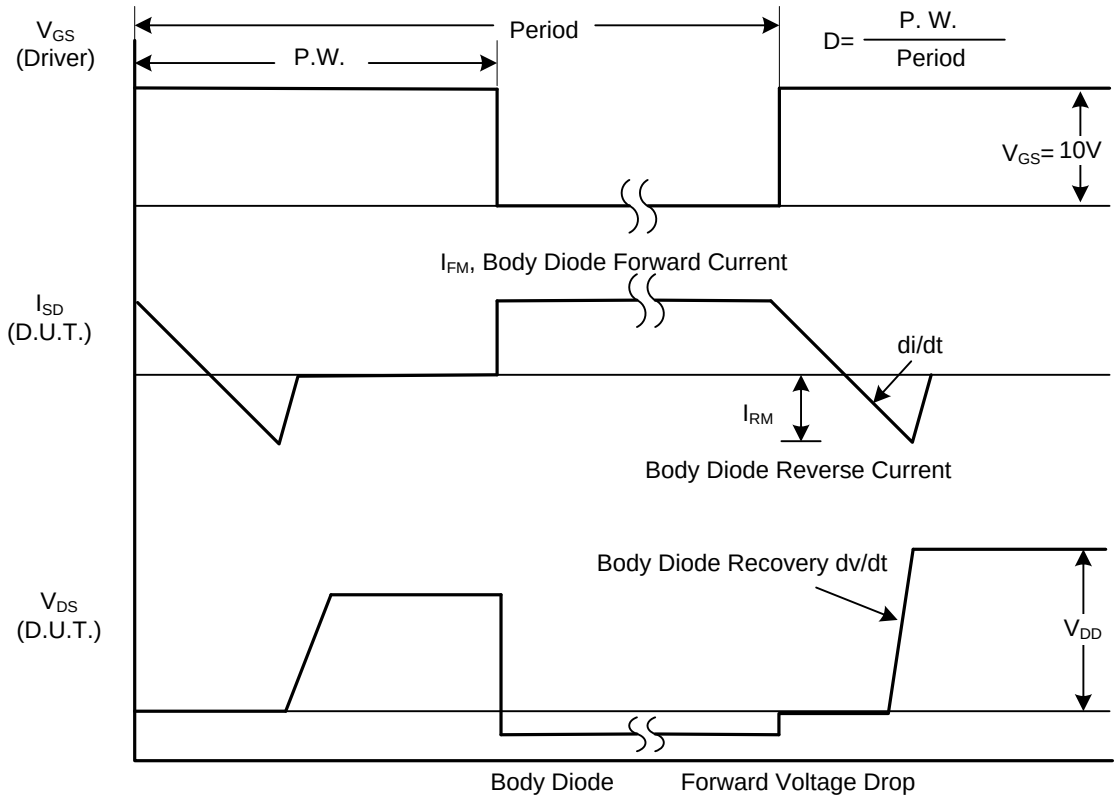
PARAMETER		SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Off characteristics							
Drain-Source Breakdown Voltage		BV_{DSS}	V_{GS}=0V, I_D= 250μA	650	-	-	V
Drain-Source Leakage Current		I_{DSS}	V_{DS}=650V, V_{GS}=0V	-	-	1	μA
Gate-Source Leakage Current	Forward	I_{GSS}	V_{GS}=30V, V_{DS}=0V	-	-	100	nA
	Reverse		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=10A	-	0.4	0.45	Ω
Dynamic characteristics							
Input Capacitance		C_{ISS}	V_{GS}=0V, V_{DS}=25V, f=1.0MHz	-	2512	-	pF
Output Capacitance		C_{OSS}		-	231	-	pF
Reverse Transfer Capacitance		C_{RSS}		-	14	-	pF
Switching characteristics							
Total Gate Charge (Note 1)		Q_G	V_{DS}=100V, V_{GS}=10V, I_D=20A I_G=1mA (Note 1, 2)	-	54	-	nC
Gateource Charge		Q_{GS}		-	10	-	nC
Gate-Drain Charge		Q_{GD}		-	13	-	nC
Turn-on Delay Time (Note 1)		$t_{D(ON)}$	V_{DS}=100V, V_{GS}=10V, I_D=20A, R_G=25Ω (Note 1, 2)	-	28	-	ns
Rise Time		t_R		-	35	-	ns
Turn-off Delay Time		$t_{D(OFF)}$		-	140	-	ns
Fall-Time		t_F		-	76	-	ns
Source-drain diode ratings and characteristics							
Maximum Body-Diode Continuous Current		I_S		-	-	20	A
Maximum Body-Diode Pulsed Current		I_{SM}		-	-	40	A
Drain-Source Diode Forward Voltage (Note 1)		V_{SD}	V_{GS}=0V, I_S=20A	-	-	1.4	V
Reverse Recovery Time (Note 1)		t_{rr}	V_{GS}=0V, I_S=20A, dI_F/dt=100A/μs (Note1)	-	506	-	ns
Reverse Recovery Charge		Q_{rr}		-	9	-	μC

Notes: 1. Pulse Test : Pulse width ≤ 300μs, Duty cycle ≤ 2%.
2. Essentially independent of operating temperature.

■ TEST CIRCUITS AND WAVEFORMS

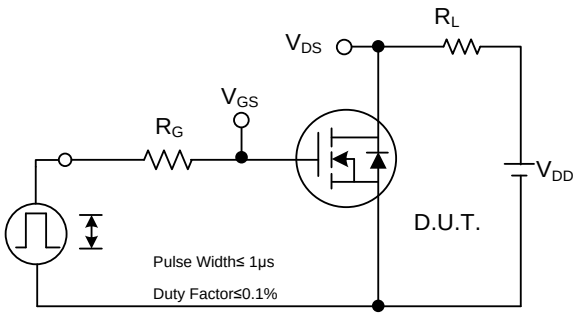


Peak Diode Recovery dv/dt Test Circuit

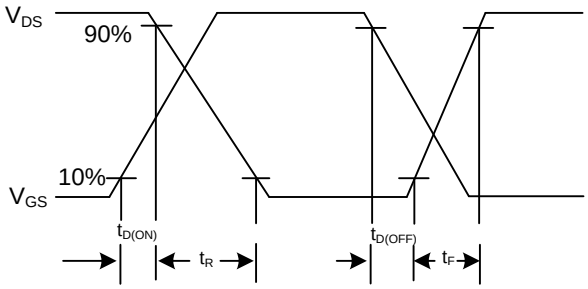


Peak Diode Recovery dv/dt Waveforms

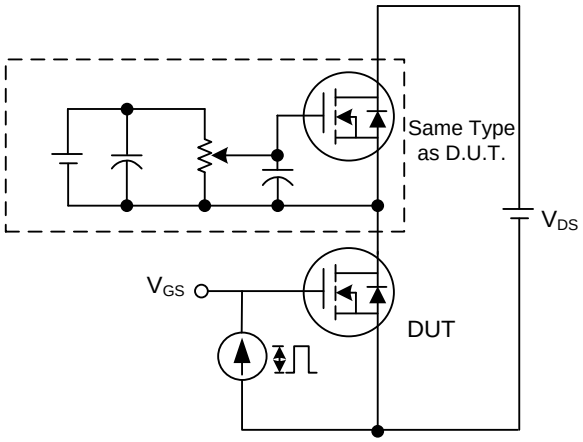
■ TEST CIRCUITS AND WAVEFORMS(Cont.)



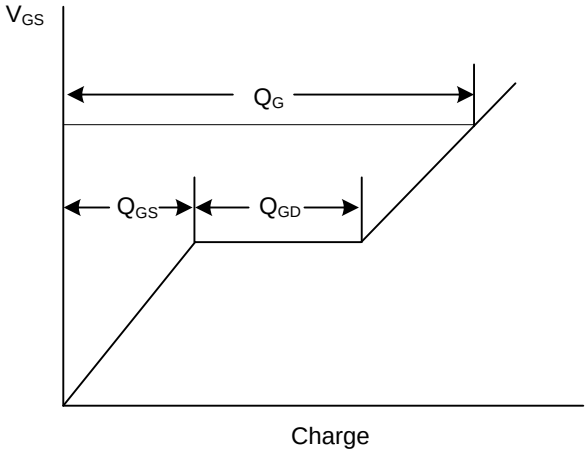
Switching Test Circuit



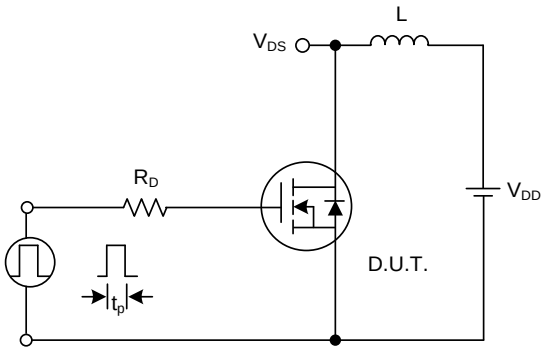
Switching Waveforms



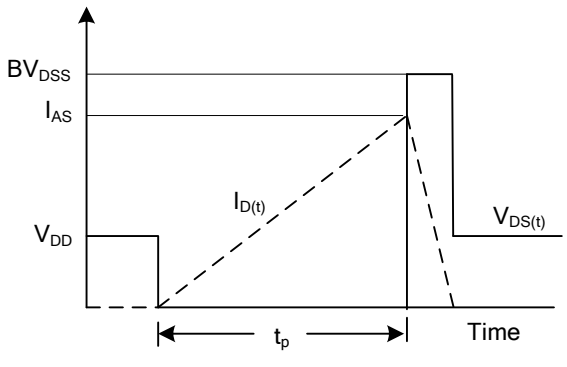
Gate Charge Test Circuit



Gate Charge Waveform



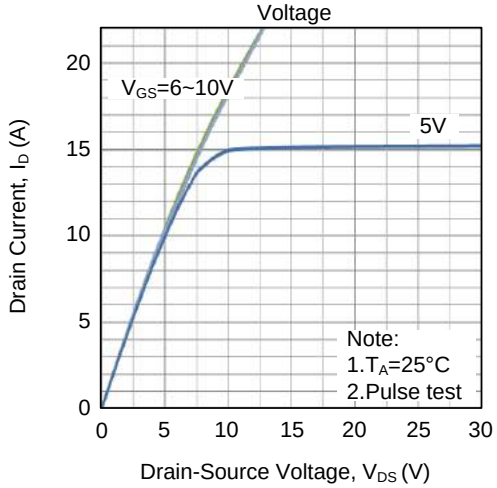
Unclamped Inductive Switching Test Circuit



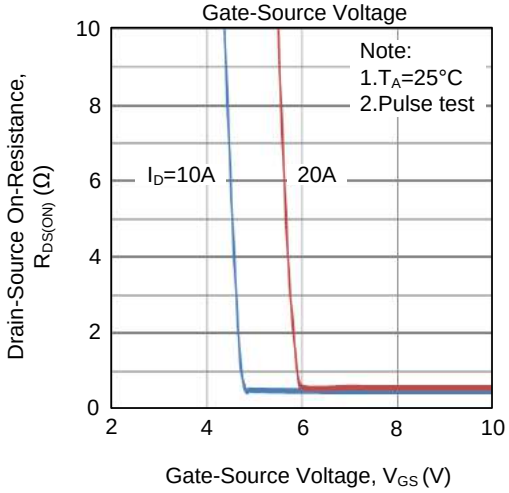
Unclamped Inductive Switching Waveforms

■ TYPICAL CHARACTERISTICS

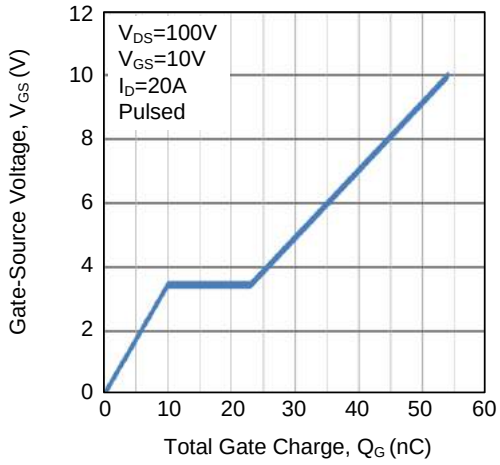
Drain Current vs. Drain-Source Voltage



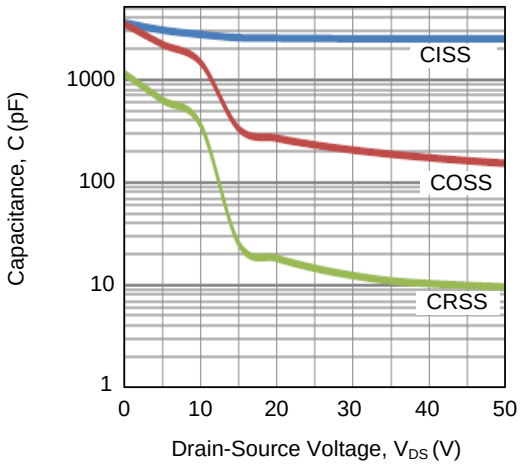
Drain-Source On-Resistance vs. Gate-Source Voltage



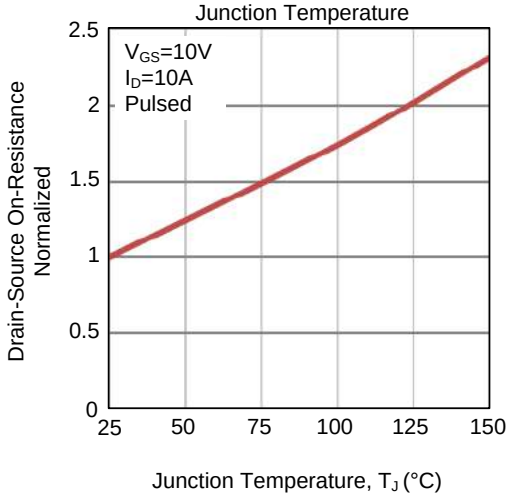
Gate Charge Characteristics



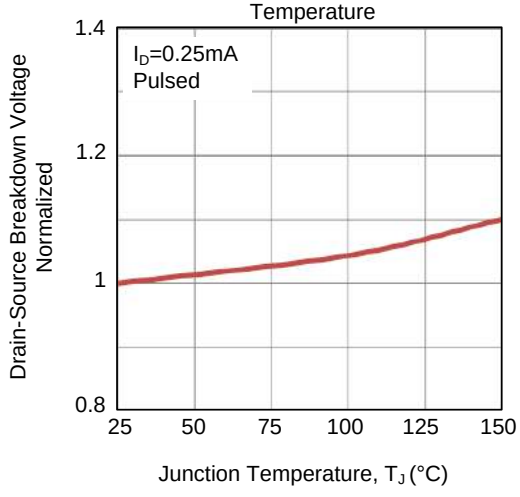
Capacitance Characteristics



Drain-Source On-Resistance vs. Junction Temperature

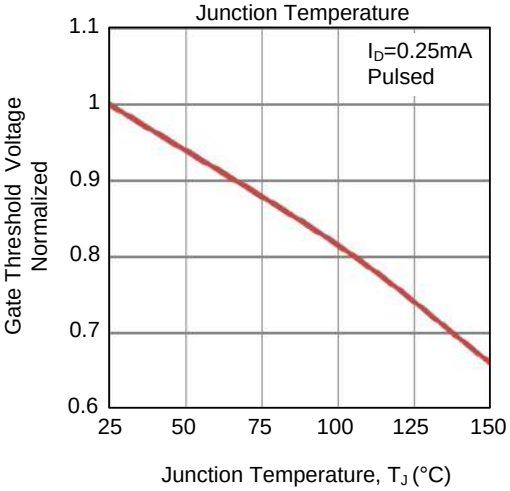


Breakdown Voltage vs. Junction Temperature

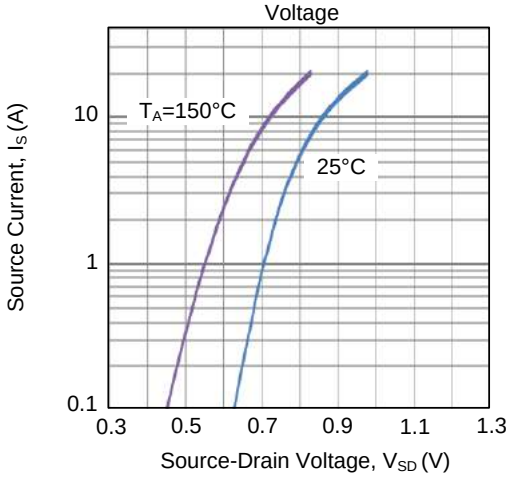


■ TYPICAL CHARACTERISTICS(Cont.)

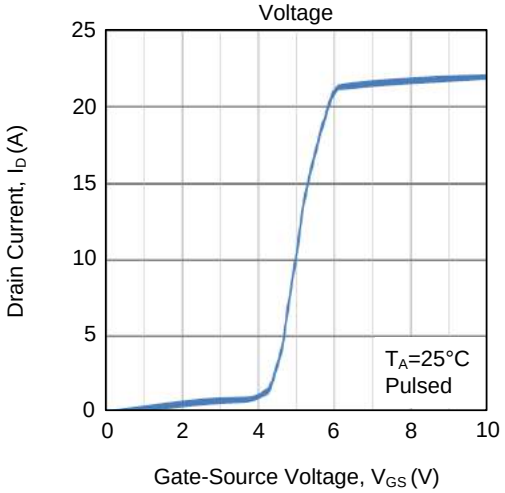
Gate Threshold Voltage vs. Junction Temperature



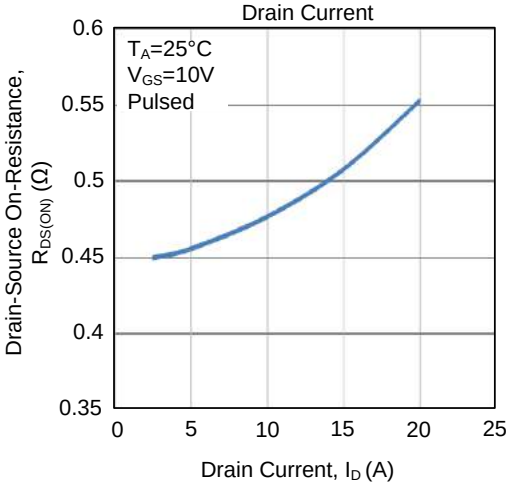
Source Current vs. Source-Drain Voltage



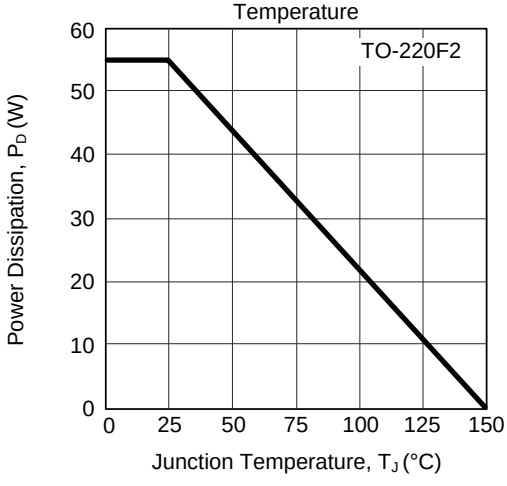
Drain Current vs. Gate-Source Voltage



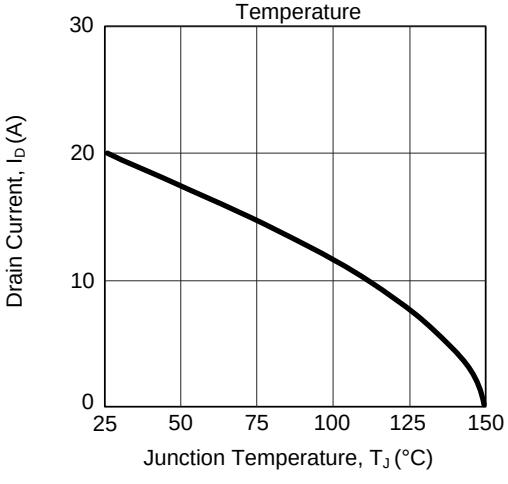
Drain-Source On-Resistance vs. Drain Current



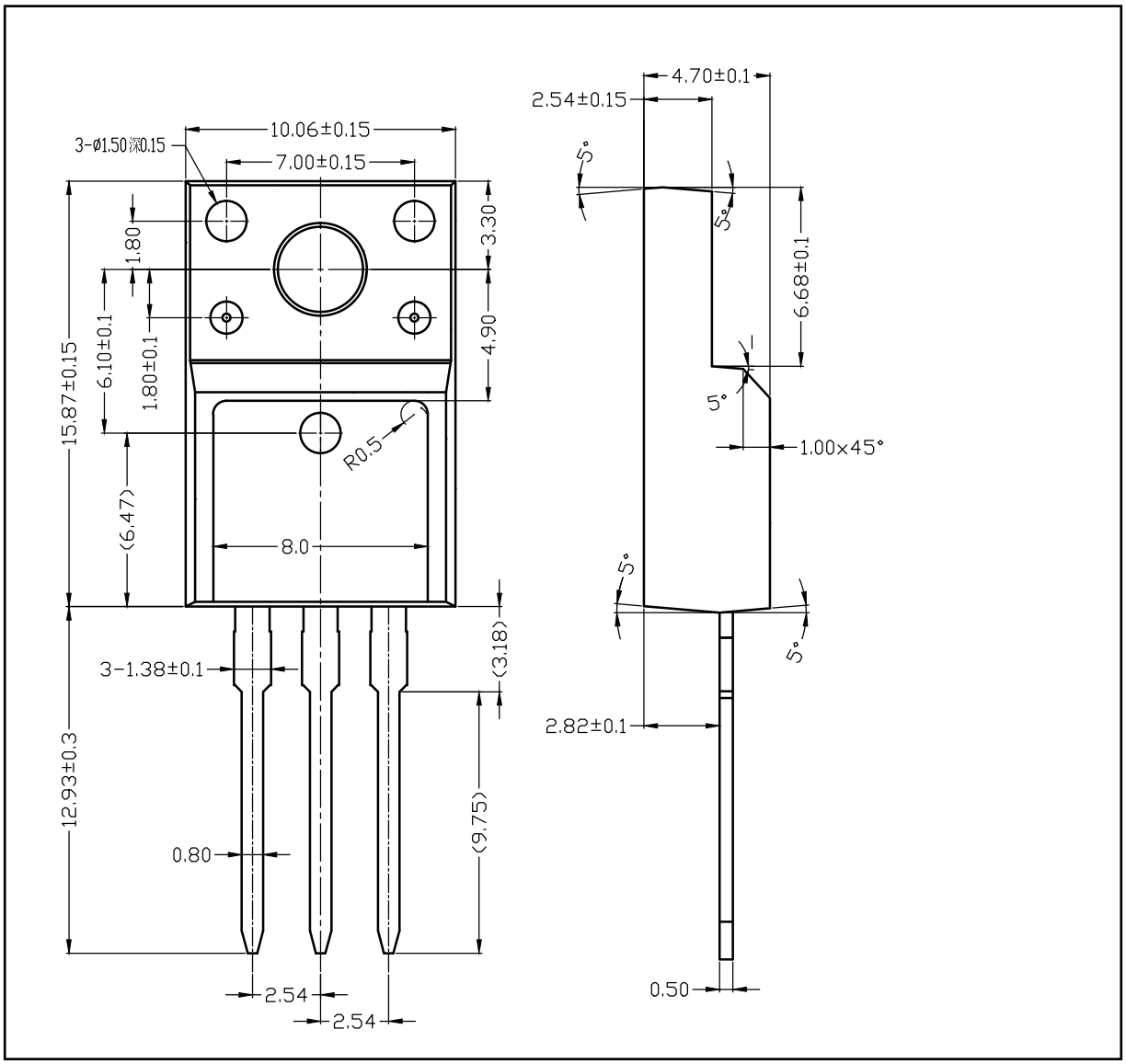
Power Dissipation vs. Junction Temperature



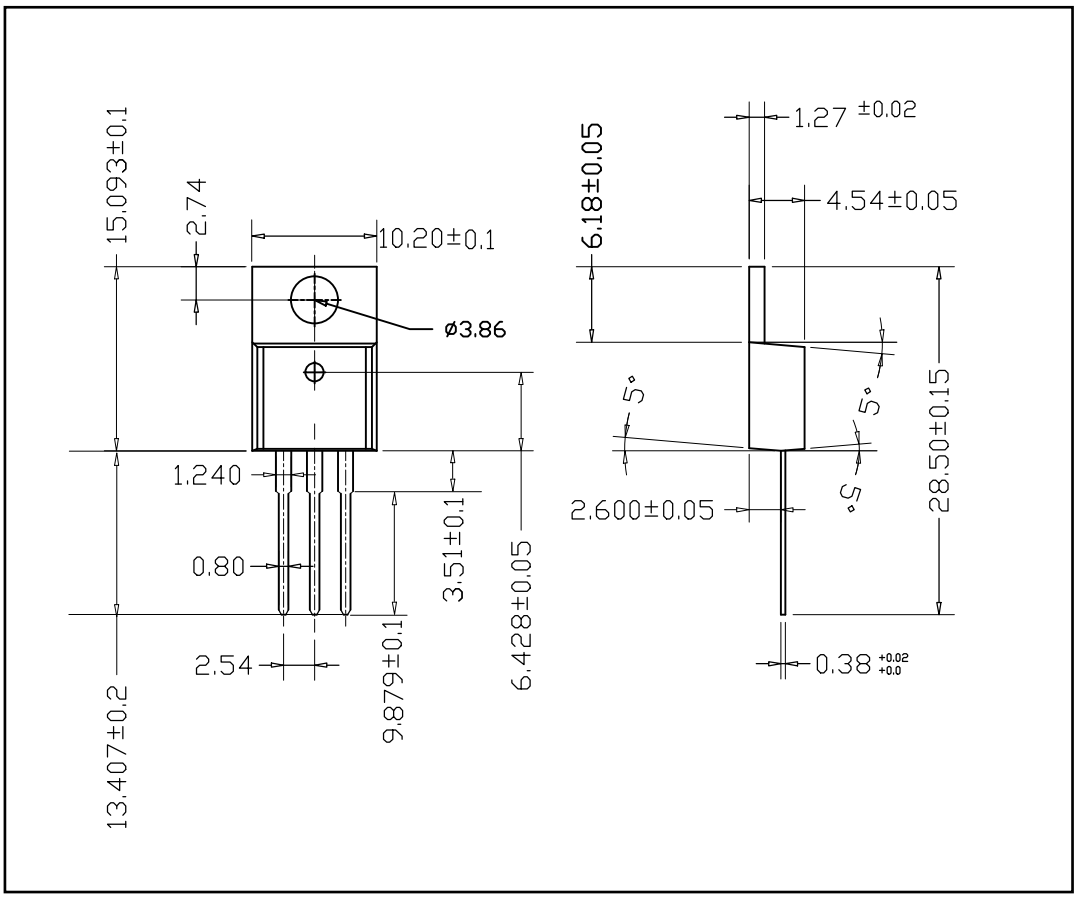
Drain Current vs. Junction Temperature



■ TO-220F-3L PACKAGE OUTLINE DIMENSIONS



■ TO-220-3L PACKAGE OUTLINE DIMENSIONS



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