

■ PRODUCT CHARACTERISTICS

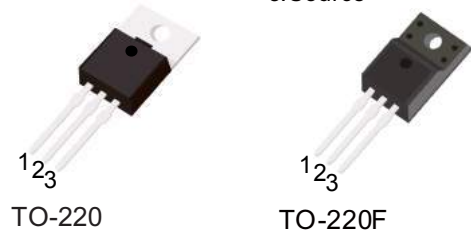
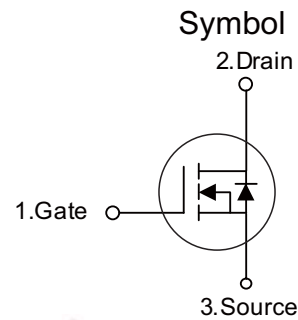
VDSS	650V
$R_{DS(on)typ.}@V_{GS}=10V$	0.8Ω
Qg@type	44nC
ID	10A

■ APPLICATIONS

- High frequency switching mode power supply
- Electronic ballast
- UPS

■ FEATURES

- \* Ultra low gate charge
- \* Fast switching capability
- \* Avalanche energy tested
- \* Improved dv/dt capability, high ruggedness



■ ORDER INFORMATION

Order codes		Package	Packing
Halogen-Free	Halogen		
N/A	MOT10N65F	TO-220F	50 pieces/Tube
N/A	MOT10N65A	TO-220	50 pieces/Tube

■ ABSOLUTE MAXIMUM RATINGS ( $T_C = 25^\circ\text{C}$  unless otherwise specified)

PARAMETER	SYMBOL	RATINGS	UNIT
Drain-Source Voltage	$V_{DSS}$	650	V
Gate-Source Voltage	$V_{GSS}$	$\pm 30$	V
Avalanche Current (Note 2)	$I_{AR}$	10	A
Drain Current	Continuous	$I_D$	10
	Pulsed (Note 2)	$I_{DM}$	38
Avalanche Energy	Single Pulsed (Note 3)	$E_{AS}$	720
	Repetitive (Note 2)	$E_{AR}$	15.6
Peak Diode Recovery dv/dt (Note 4)	dv/dt	4.5	V/ns
Power Dissipation	TO-220	$P_D$	156
	TO-220F		50
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.  $L = 14.2\text{mH}$ ,  $I_{AS} = 10\text{A}$ ,  $V_{DD} = 50\text{V}$ ,  $R_G = 25\ \Omega$  Starting  $T_J = 25^\circ\text{C}$

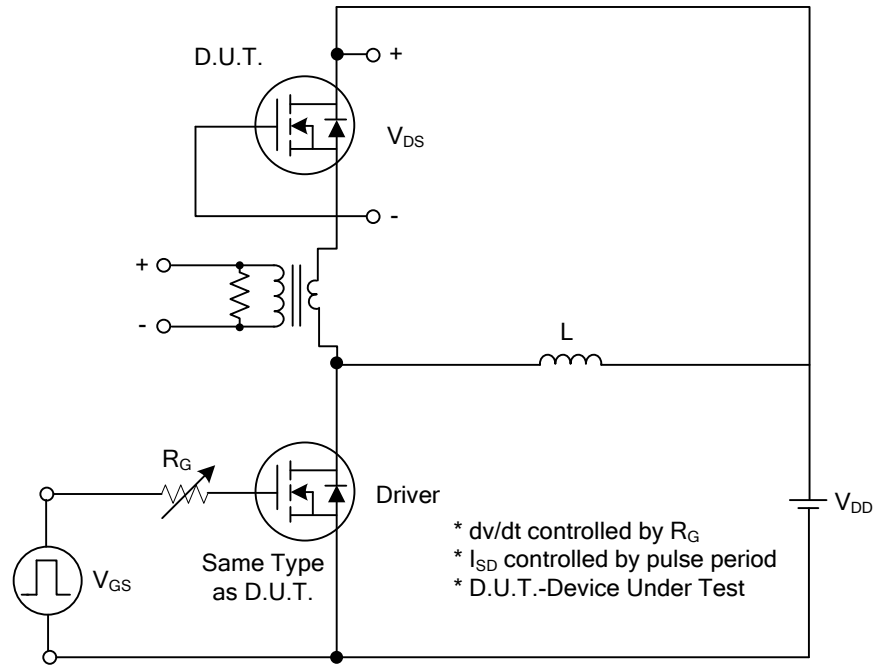
4.  $I_{SD} \leq 9.5\text{A}$ ,  $di/dt \leq 200\text{A}/\mu\text{s}$ ,  $V_{DD} \leq BV_{DSS}$ , Starting  $T_J = 25^\circ\text{C}$

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

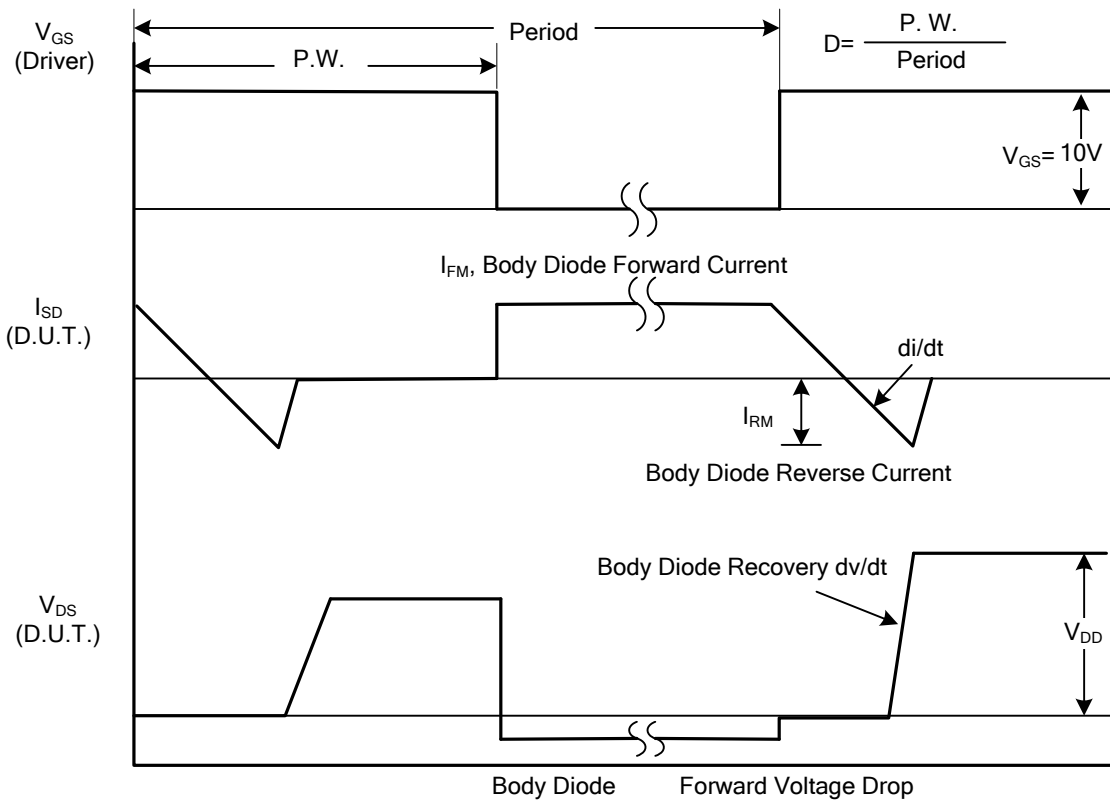
PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Off characteristics						
Drain-Source Breakdown Voltage	$BV_{DSS}$	$V_{GS} = 0V, I_D = 250\mu A$	650	-	-	V
Drain-Source Leakage Current	$I_{DSS}$	$V_{DS} = 650V, V_{GS} = 0V$	-	-	1	$\mu A$
Gate-Source Leakage Current	Forward	$I_{GSS}$	-	-	100	nA
	Reverse				-100	nA
Breakdown Voltage Temperature Coefficient	$\Delta BV_{DSS}/\Delta T_J$	$I_D = 250\mu A$ , Referenced to $25^\circ\text{C}$	-	0.7	-	$V/^\circ\text{C}$
On characteristics						
Gate Threshold Voltage	$V_{GS(TH)}$	$V_{DS} = V_{GS}, I_D = 250\mu A$	2.0	-	4.0	V
Static Drain-Source On-State Resistance	$R_{DS(ON)}$	$V_{GS} = 10V, I_D = 5.0A$	-	0.8	0.86	$\Omega$
Dynamic characteristics						
Input Capacitance	$C_{ISS}$	$V_{DS}=25V, V_{GS}=0V, f=1.0\text{ MHz}$	-	1570	-	pF
Output Capacitance	$C_{OSS}$		-	166	-	pF
Reverse Transfer Capacitance	$C_{RSS}$		-	18	-	pF
Switching characteristics						
Turn-On Delay Time	$t_{D(ON)}$	$V_{DD}=325V, I_D = 10A, R_G = 25\Omega$ (Note 1, 2)	-	23	-	ns
Turn-On Rise Time	$t_R$		-	69	-	ns
Turn-Off Delay Time	$t_{D(OFF)}$		-	144	-	ns
Turn-Off Fall Time	$t_F$		-	77	-	ns
Total Gate Charge	$Q_G$	$V_{DS}=520V, I_D=10A, V_{GS}=10\text{ V}$ (Note 1, 2)	-	44	-	nC
Gate-Source Charge	$Q_{GS}$		-	6.7	-	nC
Gate-Drain Charge	$Q_{GD}$		-	18.5	-	nC
Drain-source diode characteristics and maximum ratings						
Drain-Source Diode Forward Voltage	$V_{SD}$	$V_{GS} = 0\text{ V}, I_S = 10A$	-	-	1-4	V
Maximum Continuous Drain-Source Diode Forward Current	$I_S$		-	-	10	A
Maximum Pulsed Drain-Source Diode Forward Current	$I_{SM}$		-	-	38	A
Reverse Recovery Time	$t_{rr}$	$V_{GS} = 0\text{ V}, I_S = 10A,$	-	420	-	ns
Reverse Recovery Charge	$Q_{RR}$	$dI_F / dt = 100\text{ A}/\mu\text{s}$ (Note 1)	-	4.2	-	$\mu\text{C}$

Notes: 1. Pulse Test : Pulse width  $\leq 300\mu\text{s}$ , Duty cycle  $\leq 2\%$   
2. Essentially independent of operating temperature

■ TEST CIRCUITS AND WAVEFORMS

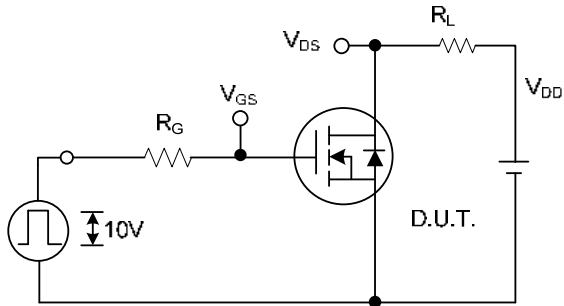


Peak Diode Recovery  $dv/dt$  Test Circuit

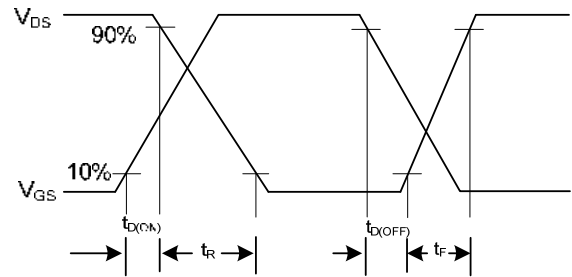


Peak Diode Recovery  $dv/dt$  Waveforms

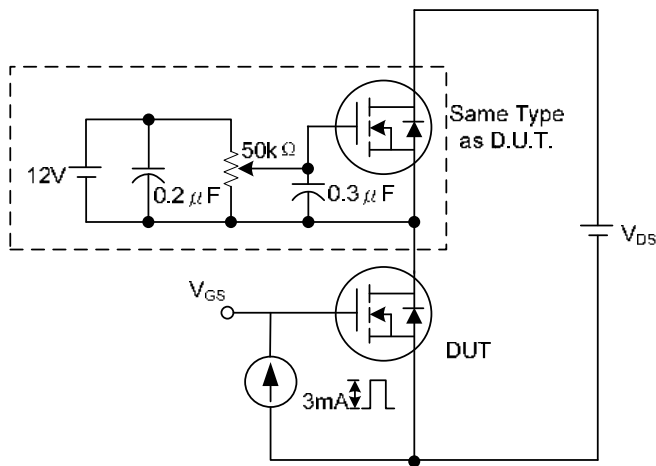
■ TEST CIRCUITS AND WAVEFORMS(Cont.)



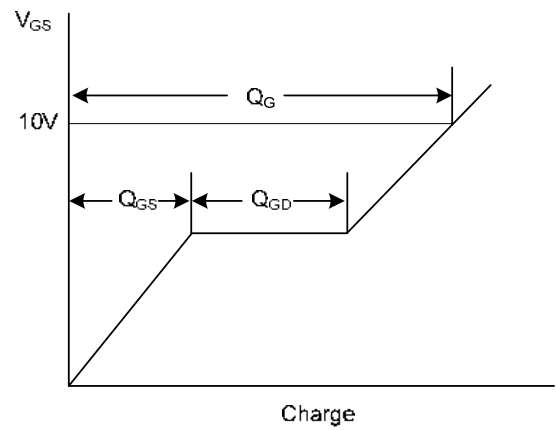
Switching Test Circuit



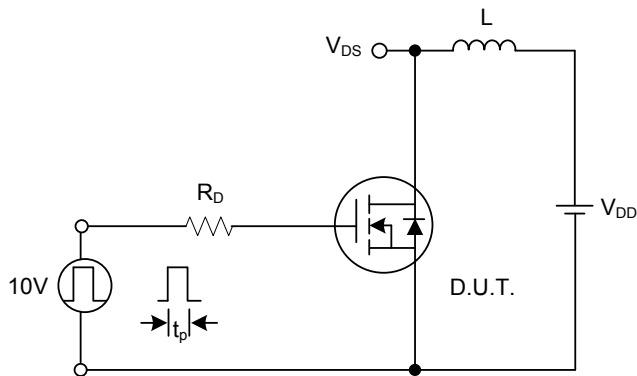
Switching Waveforms



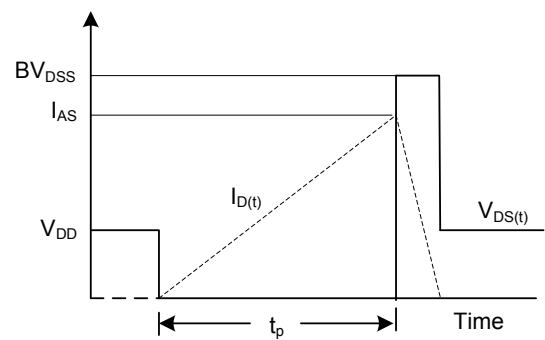
Gate Charge Test Circuit



Gate Charge Waveform



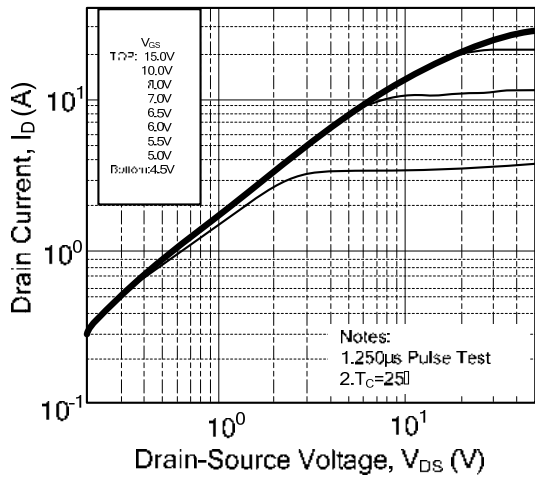
Unclamped Inductive Switching Test Circuit



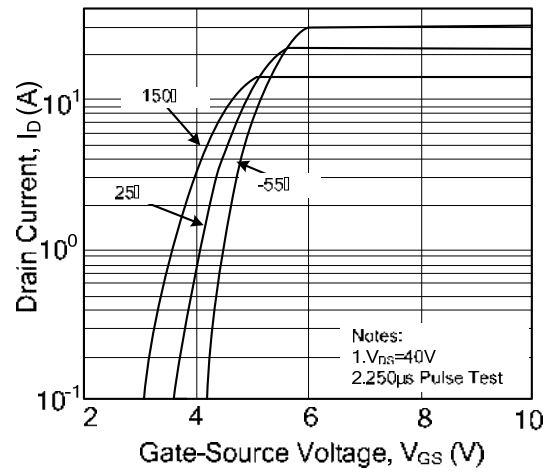
Unclamped Inductive Switching Waveforms

■ TYPICAL CHARACTERISTICS

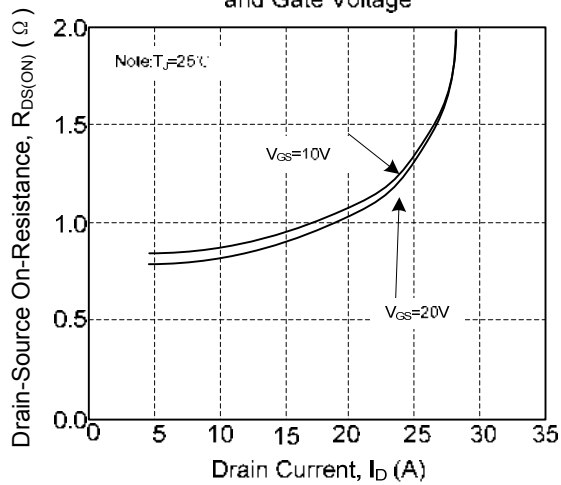
On-Region Characteristics



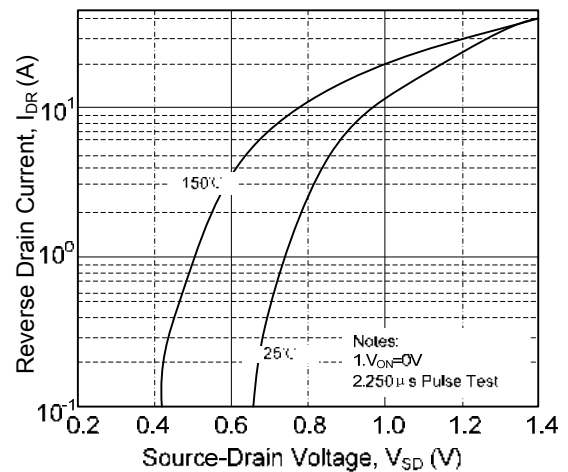
Transfer Characteristics



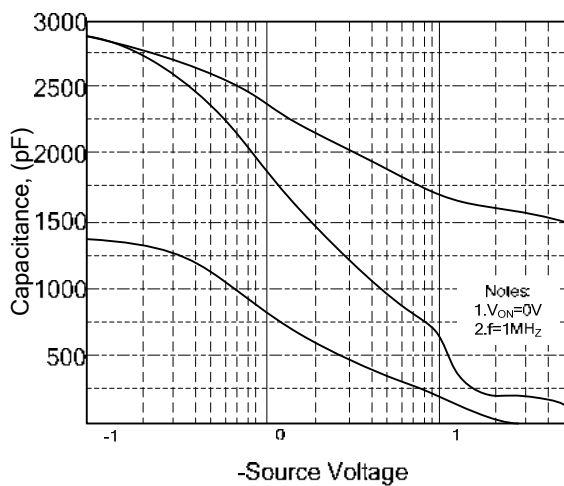
On-Resistance Variation vs. Drain Current and Gate Voltage



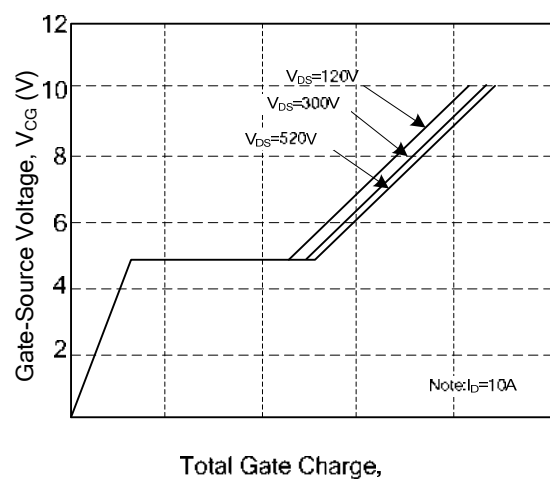
Body Diode Forward Voltage Variation with Source Current and Temperature



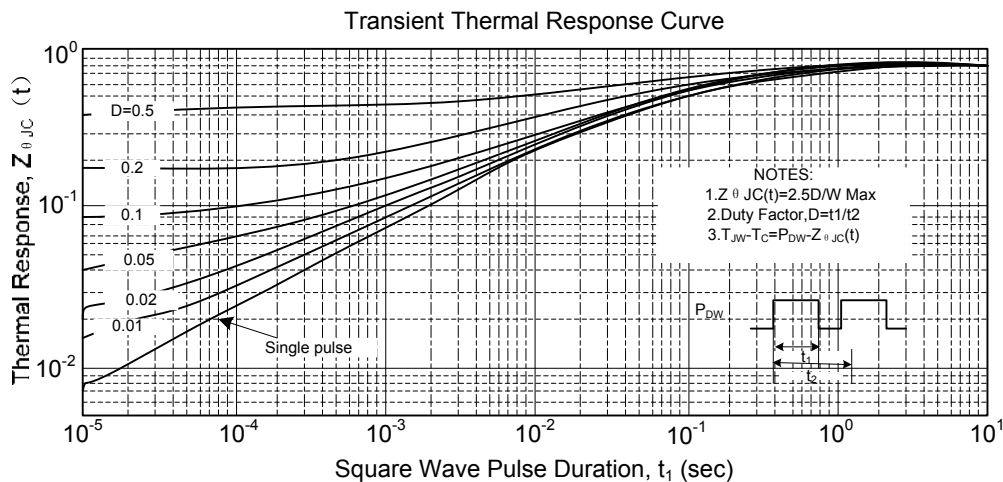
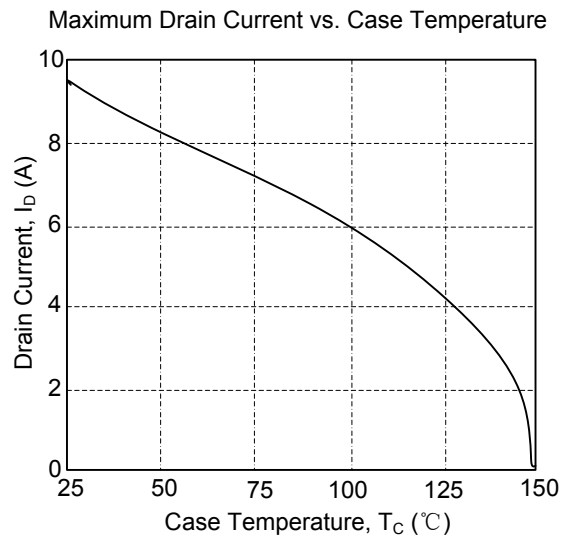
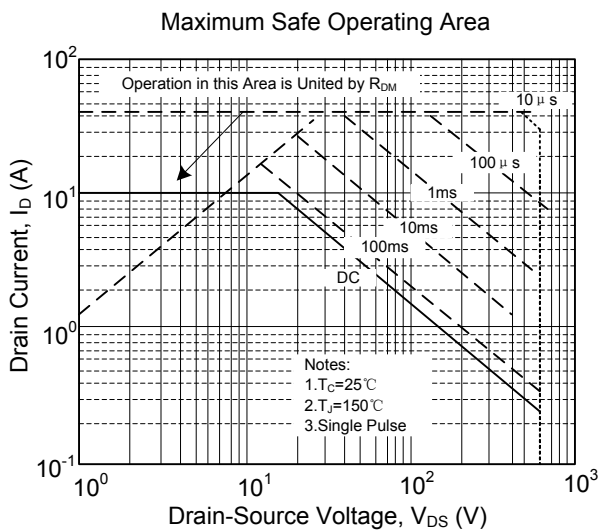
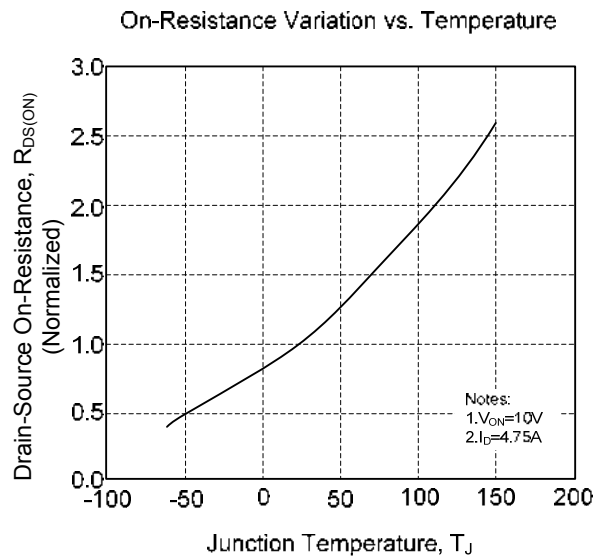
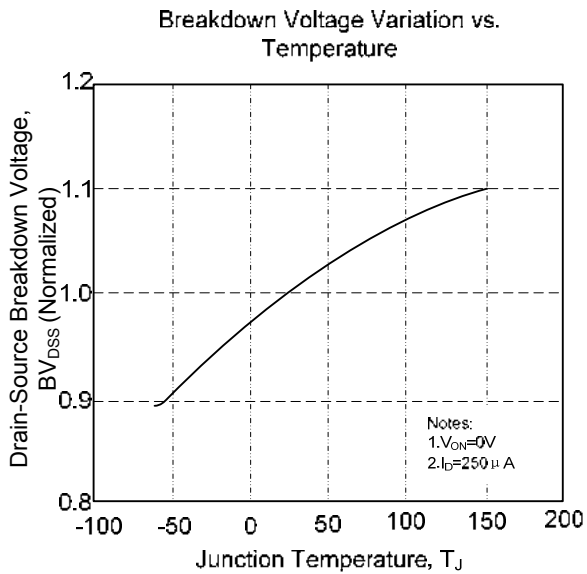
Capacitance Characteristics



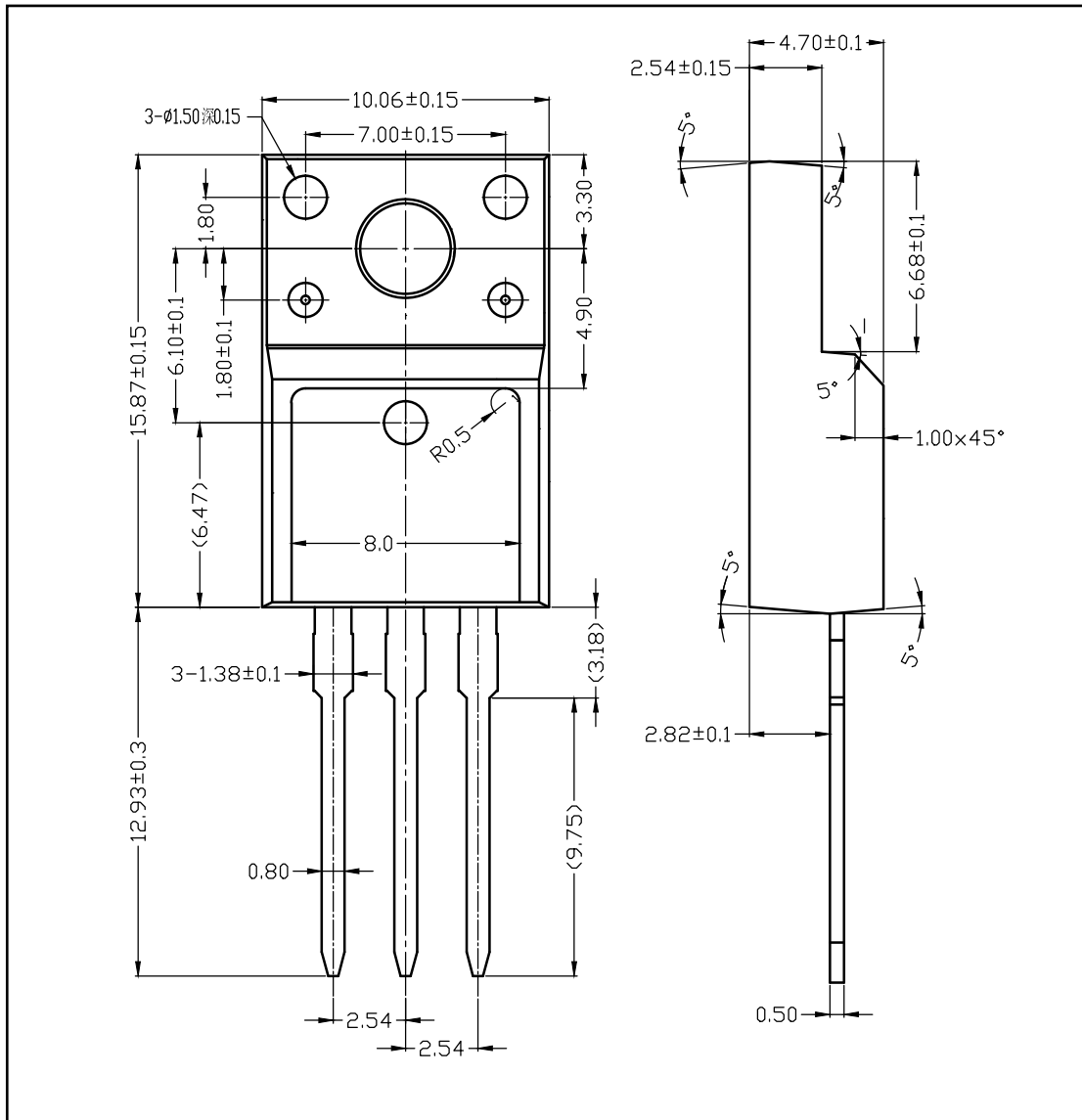
Gate Charge Characteristics



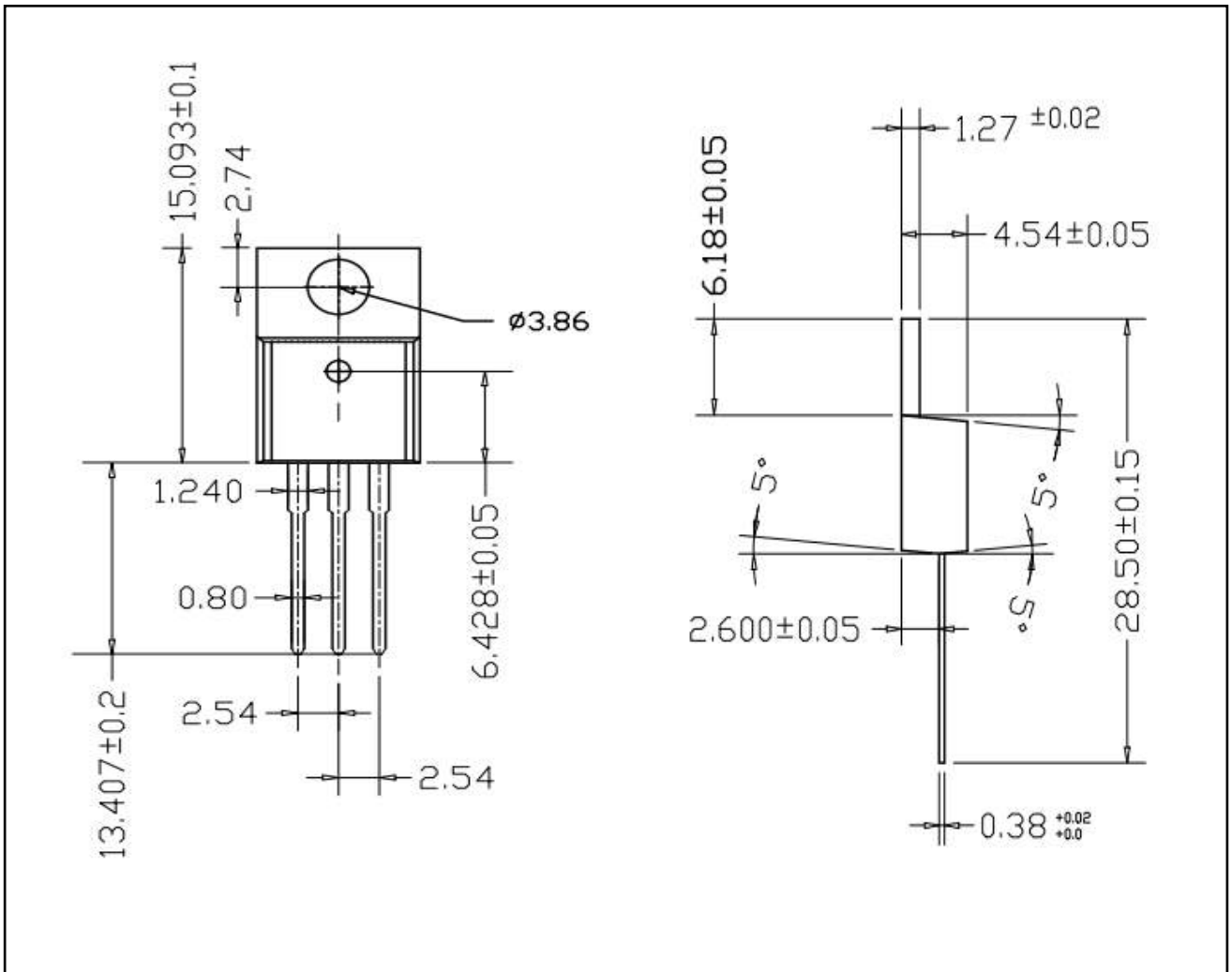
■ TYPICAL CHARACTERISTICS(Cont.)



■ TO-220F PACKAGE OUTLINE DIMENSIONS



■ TO-220 PACKAGE OUTLINE DIMENSIONS





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