Electrical Characteristics

T_C = 25°C unless otherwise noted

Symbol	Parameter	Test Conditions	Min	Typ	Max	Units
Off Characteristics						
BV_{DSS}	Drain-Source Breakdown Voltage	V_{GS} = 0 V, I_D = 250 µA	800	--	--	V
ΔBV_{DSS} / ΔT_J	Breakdown Voltage Temperature Coefficient	I_D = 250 µA, Referenced to 25°C	--	0.9	--	V/°C
I_{DSS}	Zero Gate Voltage Drain Current	V_{DS} = 800 V, V_{GS} = 0 V	--	--	10	µA
		V_{DS} = 640 V, T_C = 125°C	--	--	100	µA
I_{GSSF}	Gate-Body Leakage Current, Forward	V_{GS} = 30 V, V_{DS} = 0 V	--	--	100	nA
I_{GSSR}	Gate-Body Leakage Current, Reverse	V_{GS} = -30 V, V_{DS} = 0 V	--	--	-100	nA
On Characteristics						
$V_{GS(th)}$	Gate Threshold Voltage	V_{DS} = V_{GS}, I_D = 250 µA	3.0	--	5.0	V
$R_{DS(on)}$	Static Drain-Source On-Resistance	V_{GS} = 10 V, I_D = 1.65 A	--	1.5	1.95	Ω
g_{FS}	Forward Transconductance	V_{DS} = 50 V, I_D = 1.65 A (Note 4)	--	4.3	--	S
Dynamic Characteristics						
C_{iss}	Input Capacitance	V_{DS} = 25 V, V_{GS} = 0 V, f = 1.0 MHz	--	1150	1500	pF
C_{oss}	Output Capacitance		--	125	160	pF
C_{rss}	Reverse Transfer Capacitance		--	14	18	pF
Switching Characteristics						
$t_{d(on)}$	Turn-On Delay Time	V_{DD} = 400 V, I_D = 5.8 A, R_G = 25 Ω (Note 4, 5)	--	30	70	ns
t_r	Turn-On Rise Time		--	70	150	ns
$t_{d(off)}$	Turn-Off Delay Time		--	65	140	ns
t_f	Turn-Off Fall Time		--	45	100	ns
Q_g	Total Gate Charge	V_{DS} = 640 V, I_D = 5.8 A, V_{GS} = 10 V (Note 4, 5)	--	31		nC
Q_{gs}	Gate-Source Charge		--	7.1	--	nC
Q_{gd}	Gate-Drain Charge		--	15	--	nC
Drain-Source Diode Characteristics and Maximum Ratings						
I_S	Maximum Continuous Drain-Source Diode Forward Current		--	--	3.3	A
I_{SM}	Maximum Pulsed Drain-Source Diode Forward Current		--	--	13.2	A
V_{SD}	Drain-Source Diode Forward Voltage	V_{GS} = 0 V, I_S = 3.3 A	--	--	1.4	V
t_{rr}	Reverse Recovery Time	V_{GS} = 0 V, I_S = 5.8 A, dI_F / dt = 100 A/µs (Note 4)	--	650	--	ns
Q_{rr}	Reverse Recovery Charge		--	5.7	--	µC

Notes:
1. Repetitive Rating : Pulse width limited by maximum junction temperature
2. L = 117mH, I_{AS} = 3.3A, V_{DD} = 50V, R_G = 25 Ω, Starting T_J = 25°C
3. I_{SD} ≤ 5.8A, di/dt ≤ 200A/µs, V_{DD} ≤ BV_{DSS}, Starting T_J = 25°C
4. Pulse Test : Pulse width ≤ 300µs, Duty cycle ≤ 2%
5. Essentially independent of operating temperature

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Typical Characteristics

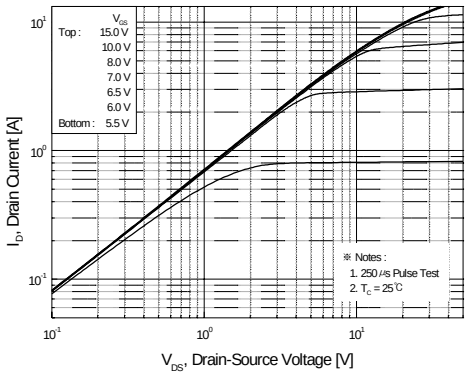

Figure 1. On-Region Characteristics

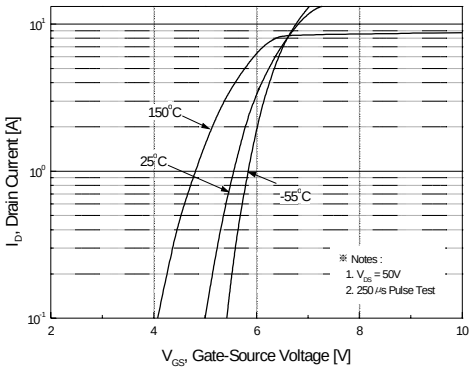

Figure 2. Transfer Characteristics

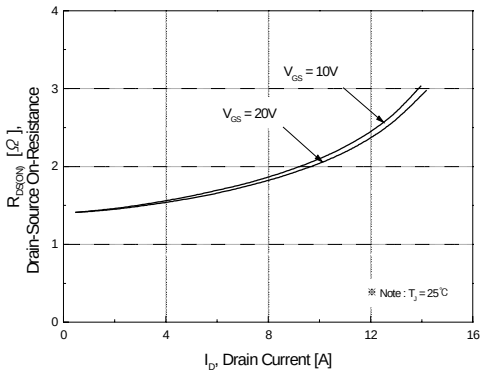

Figure 3. On-Resistance Variation vs Drain Current and Gate Voltage

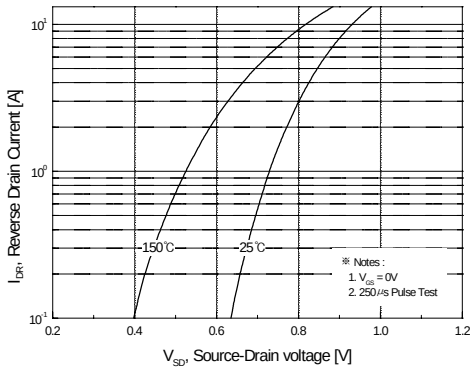

Figure 4. Body Diode Forward Voltage Variation with Source Current and Temperature

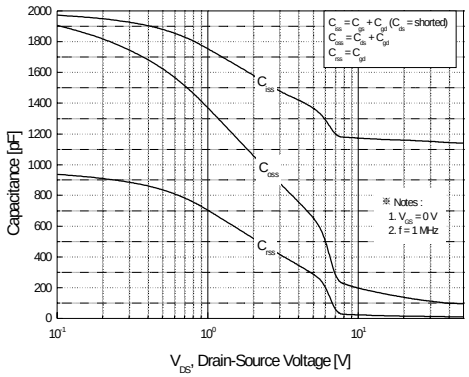

Figure 5. Capacitance Characteristics

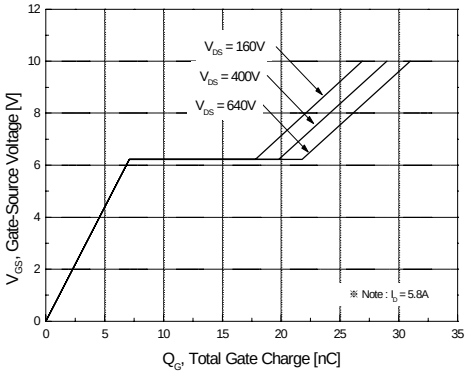

Figure 6. Gate Charge Characteristics

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Typical Characteristics (Continued)

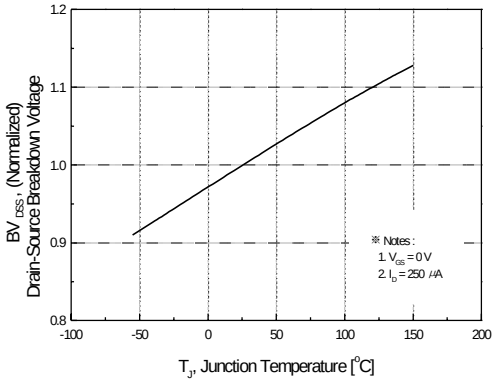

Figure 7. Breakdown Voltage Variation vs Temperature

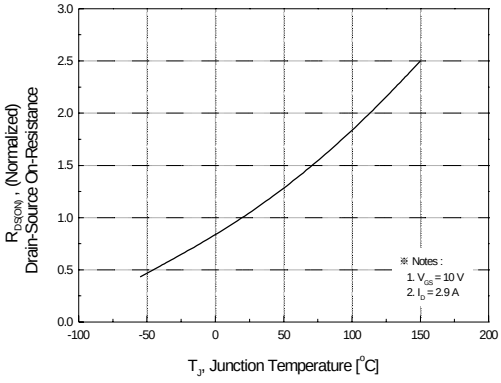

Figure 8. On-Resistance Variation vs Temperature

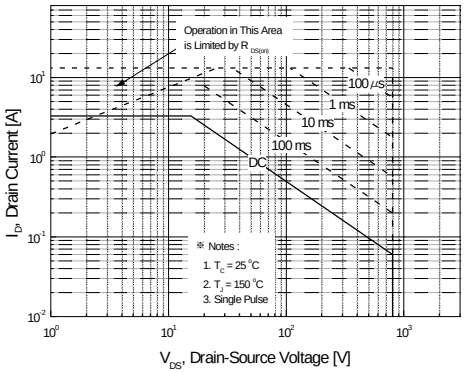

Figure 9. Maximum Safe Operating Area

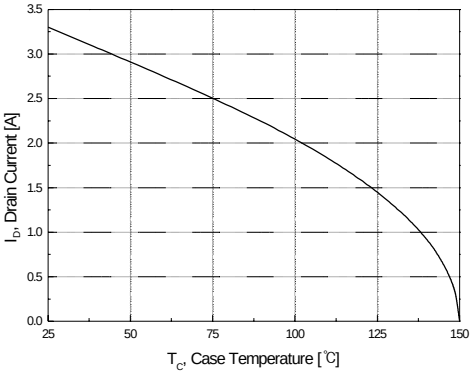

Figure 10. Maximum Drain Current vs Case Temperature

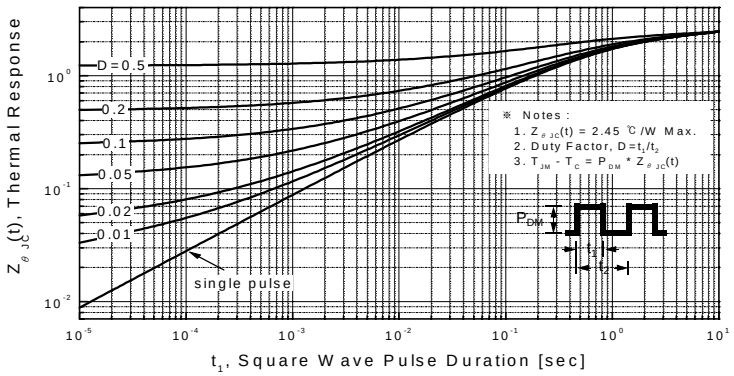

Figure 11. Transient Thermal Response Curve

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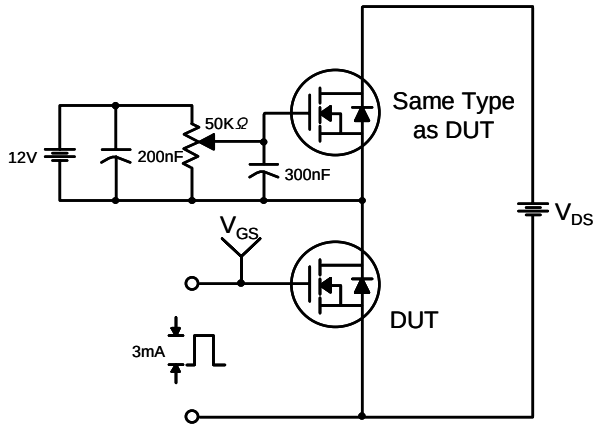
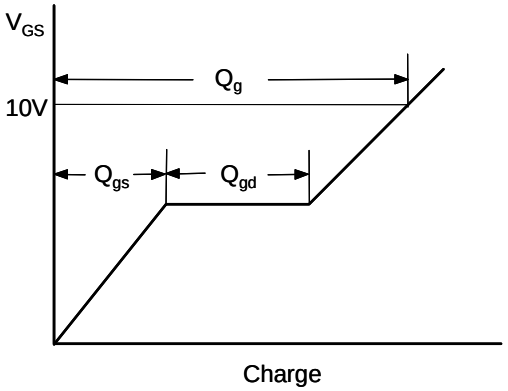
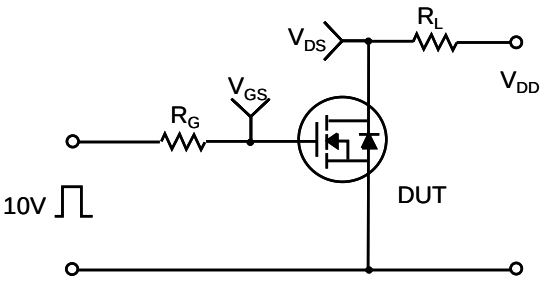
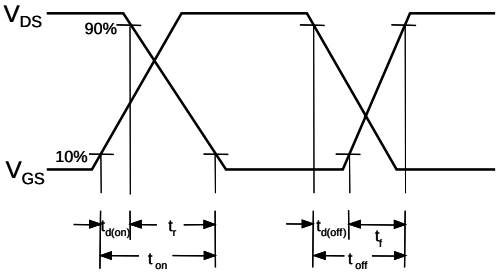
Gate Charge Test Circuit & Waveform



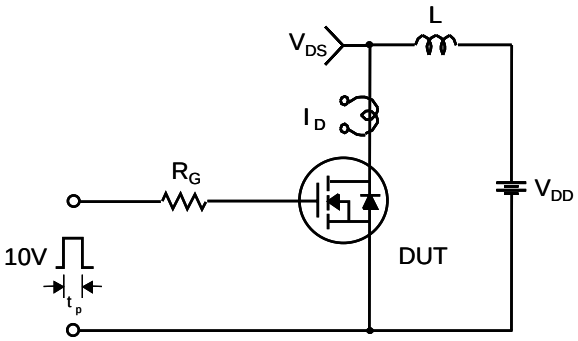


Resistive Switching Test Circuit & Waveforms

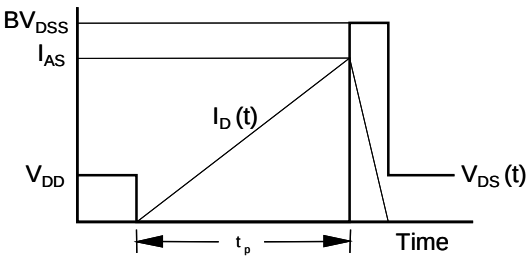




Unclamped Inductive Switching Test Circuit & Waveforms



$$E_{AS} = \frac{1}{2} L I_{AS}^2 \frac{BV_{DSS}}{BV_{DSS} - V_{DD}}$$



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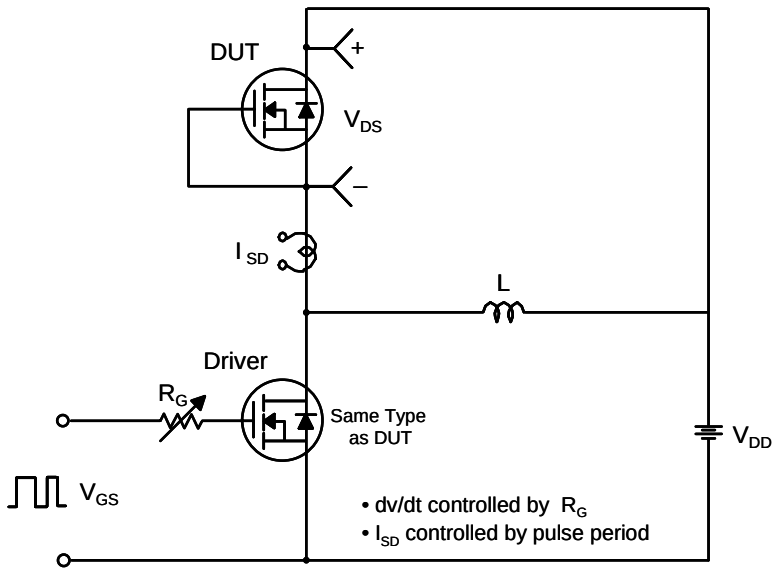
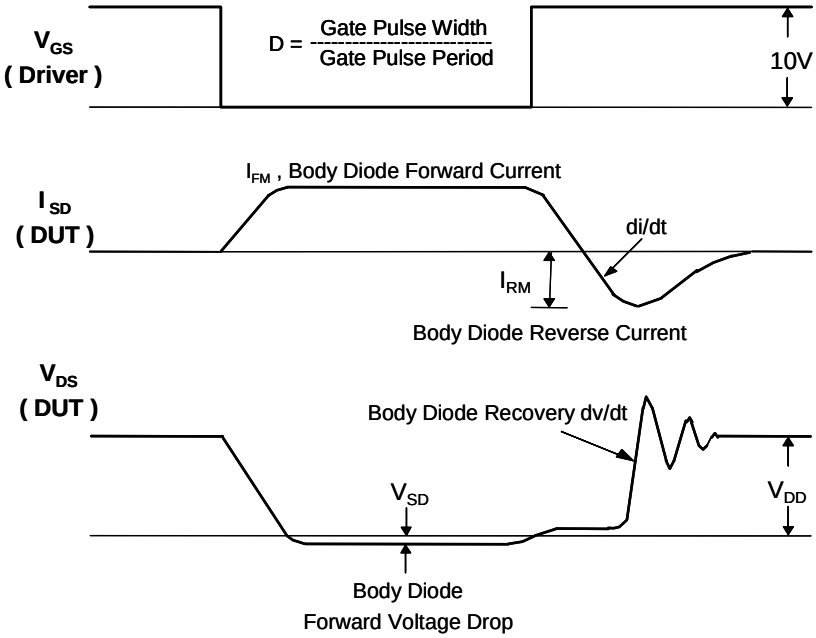
Peak Diode Recovery dv/dt Test Circuit & Waveforms





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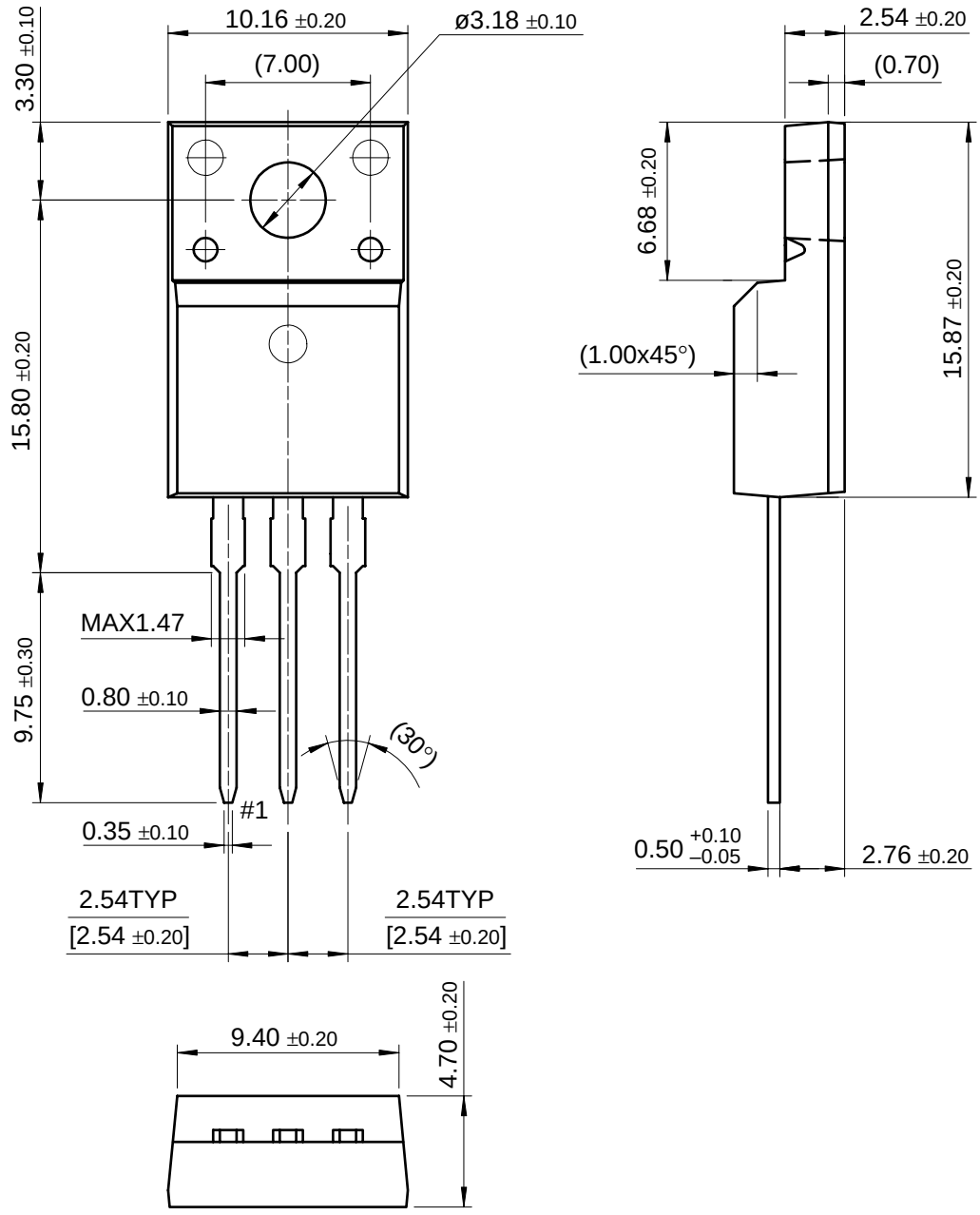
Package Dimensions

TO-220F



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