

■ PRODUCT CHARACTERISTICS

VDSS	650V
$R_{DS(on)max}(V_{GS}=10V)$	0.5Ω
Qg@type	54nC
ID	20A

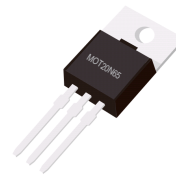
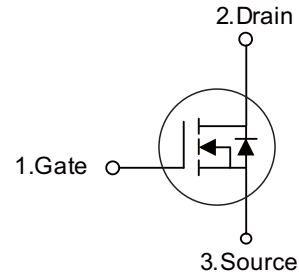
■ APPLICATIONS

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

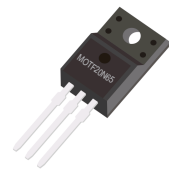
■ FEATURES

- * $R_{DS(ON)} \leq 0.5\Omega$ @ $V_{GS}=10V$
- * High Switching Speed
- * 100% Avalanche Tested

Symbol



TO-220



TO-220F

■ ORDER INFORMATION

Order codes		Package	Packing
Halogen-Free	Halogen		
N/A	MOT20N65F	TO-220F	50 pieces/Tube
N/A	MOT20N65A	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}	±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. $L = 10\text{mH}$, $I_{AS} = 10.5\text{A}$, $V_{DD} = 50\text{V}$, $R_G = 25\Omega$ Starting $T_J = 25^\circ\text{C}$

4. $I_{SD} \leq 20\text{A}$, $di/dt \leq 200\text{A}/\mu\text{s}$, $V_{DD} \leq BV_{DSS}$, Starting $T_J = 25^\circ\text{C}$

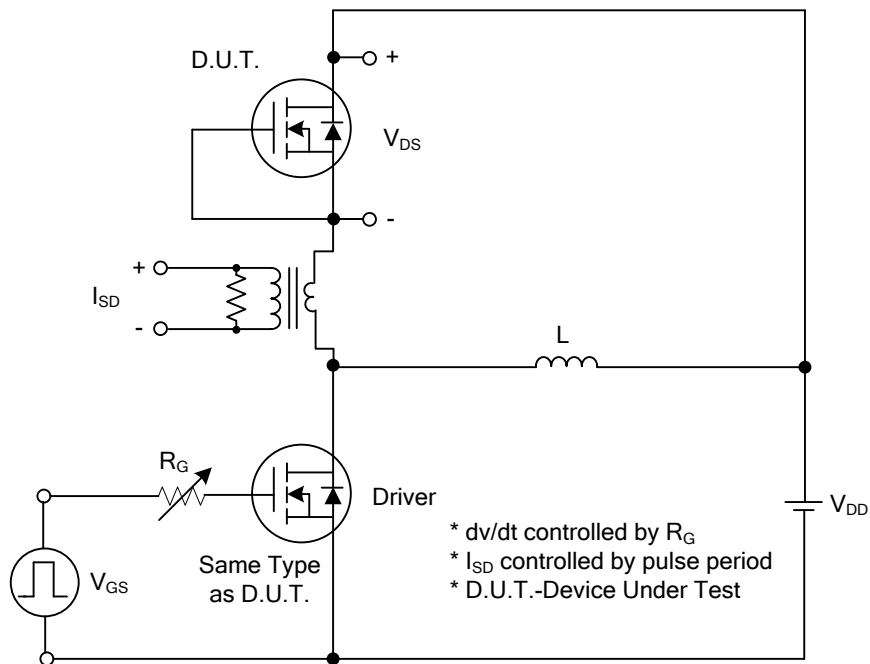
■ ELECTRICAL CHARACTERISTICS ($T_C=25^\circ\text{C}$, unless otherwise noted)

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			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
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			0.5	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,		506		ns
Reverse Recovery Charge		Q _{rr}	dl _F /dt=100A/μs (Note1)		9		μC

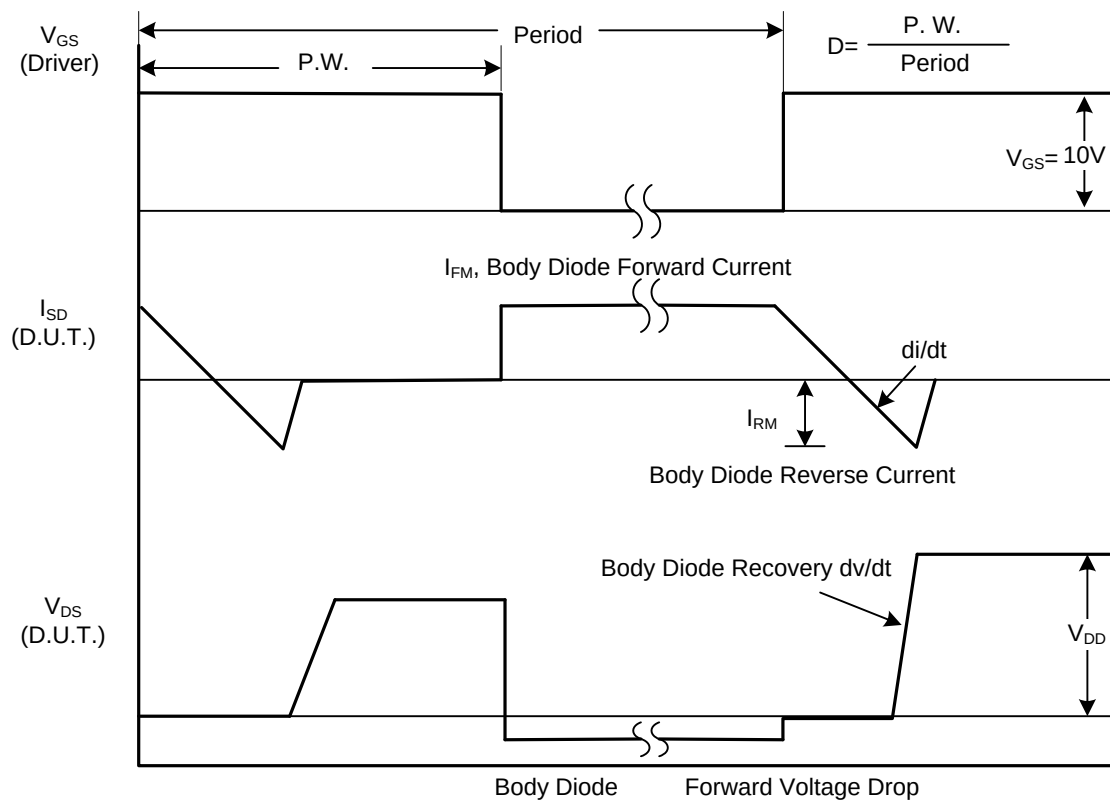
Notes: 1. Pulse Test : Pulse width $\leq 300\mu s$, Duty cycle $\leq 2\%$.

2. Essentially independent of operating temperature.

TEST CIRCUITS AND WAVEFORMS

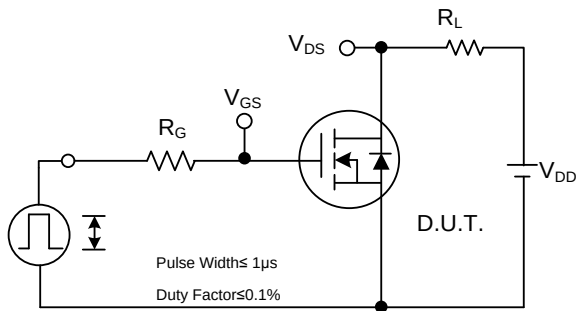


Peak Diode Recovery dv/dt Test Circuit

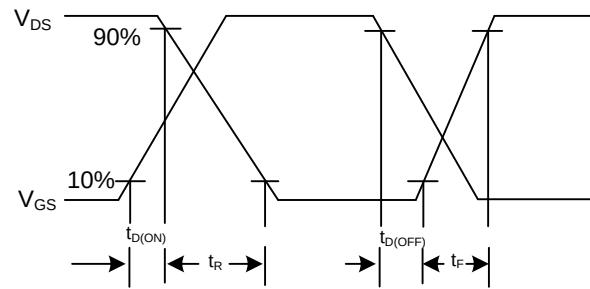


Peak Diode Recovery dv/dt Waveforms

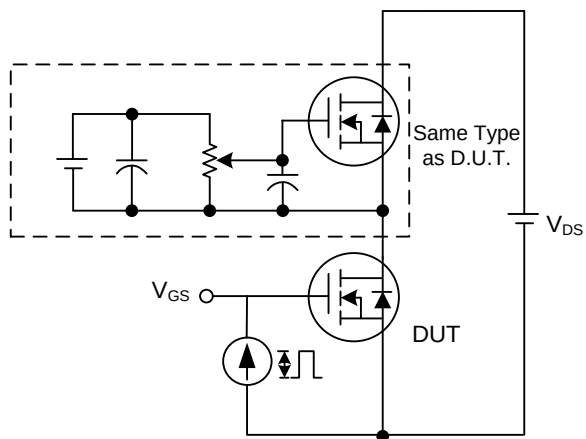
■ TEST CIRCUITS AND WAVEFORMS(Cont.)



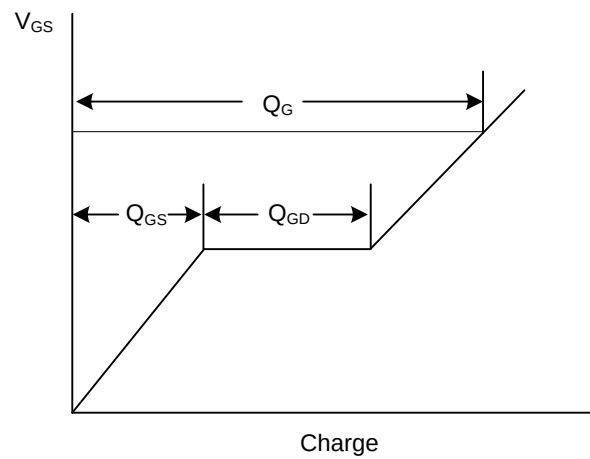
Switching Test Circuit



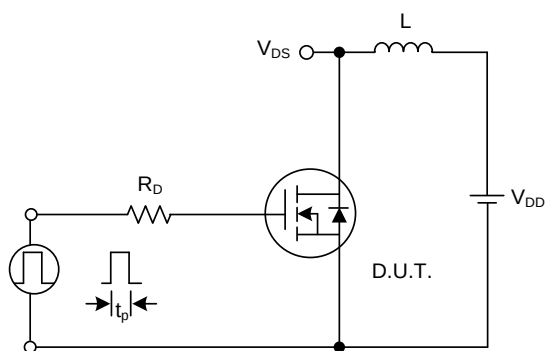
Switching Waveforms



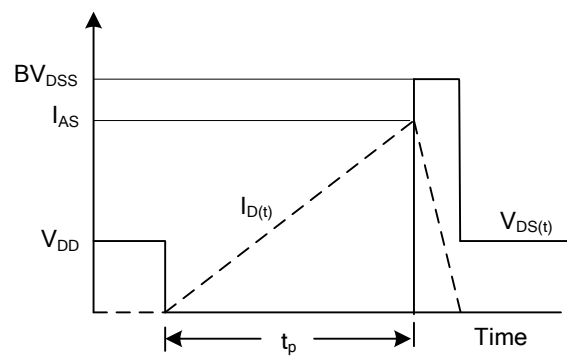
Gate Charge Test Circuit



Gate Charge Waveform

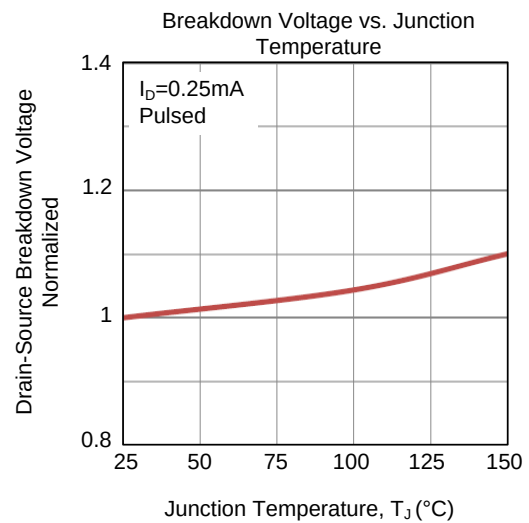
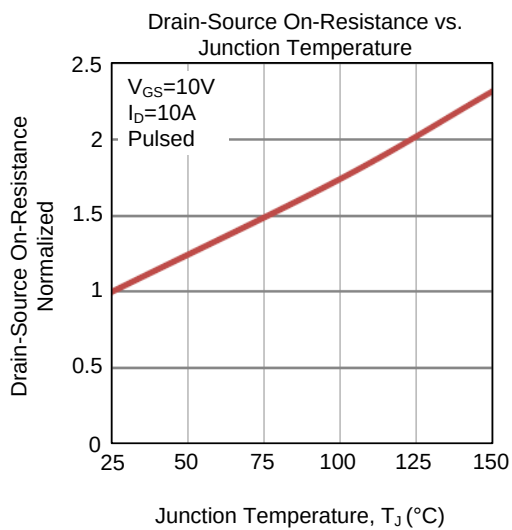
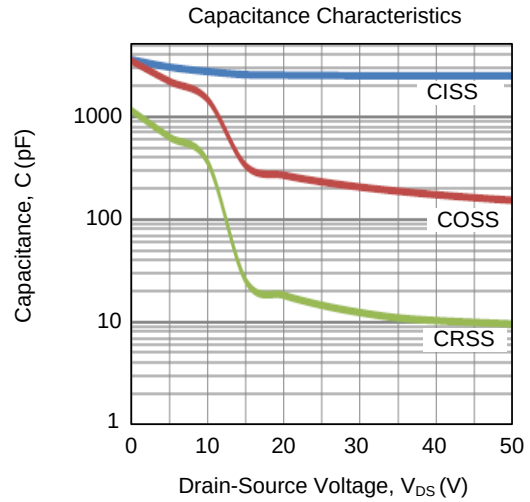
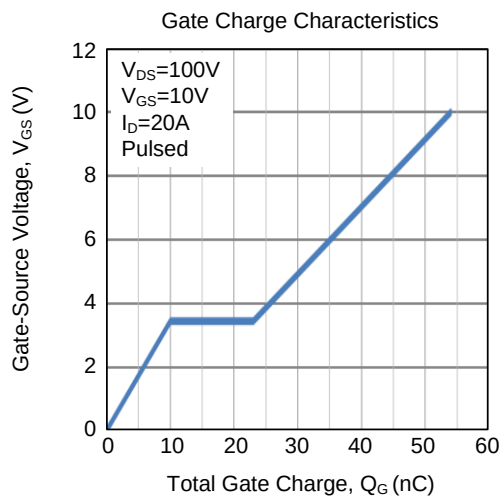
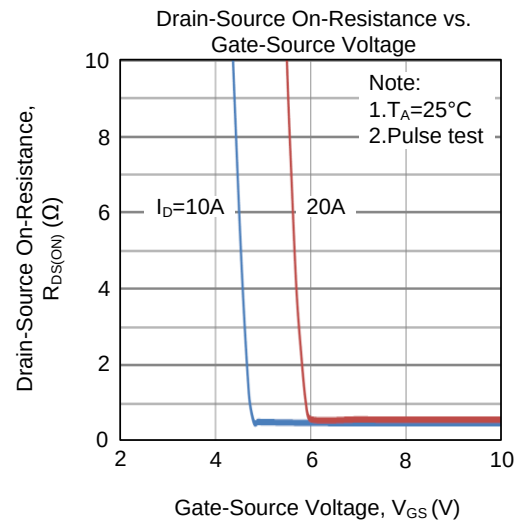
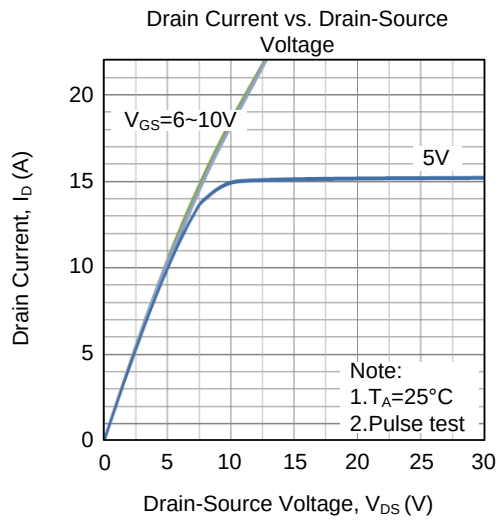


Unclamped Inductive Switching Test Circuit

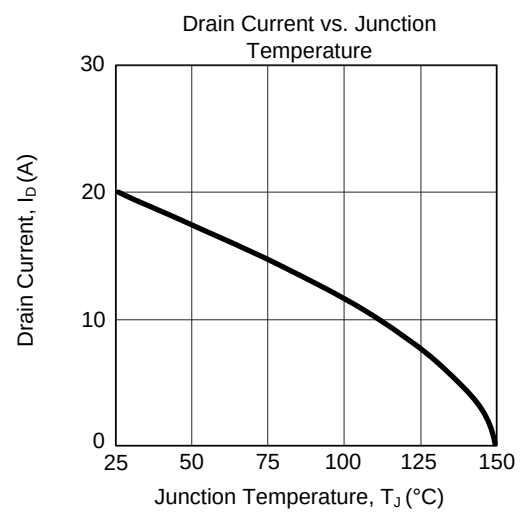
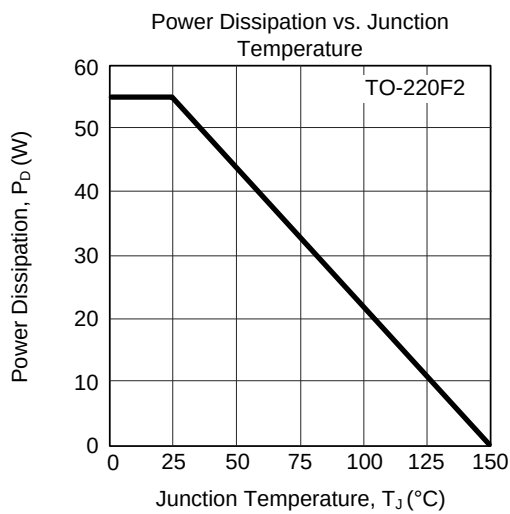
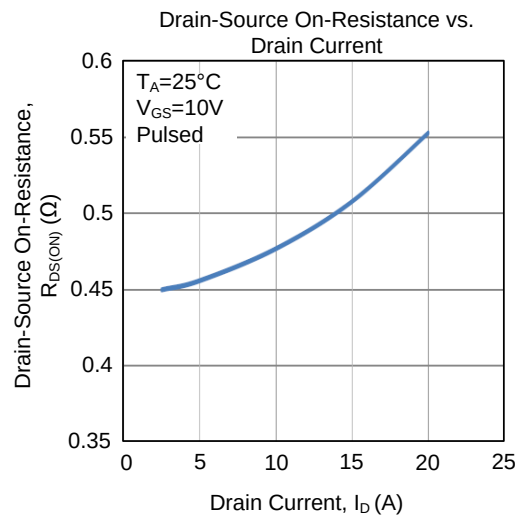
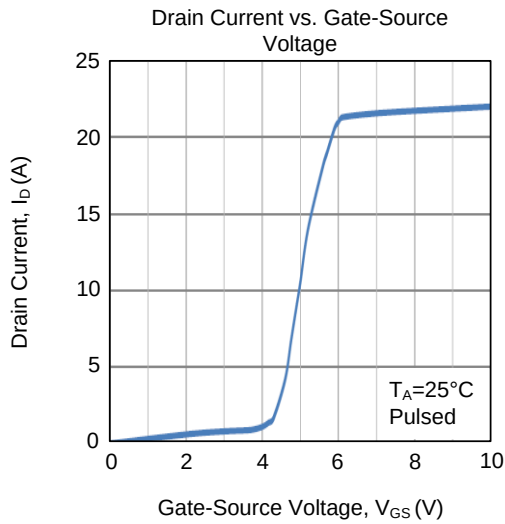
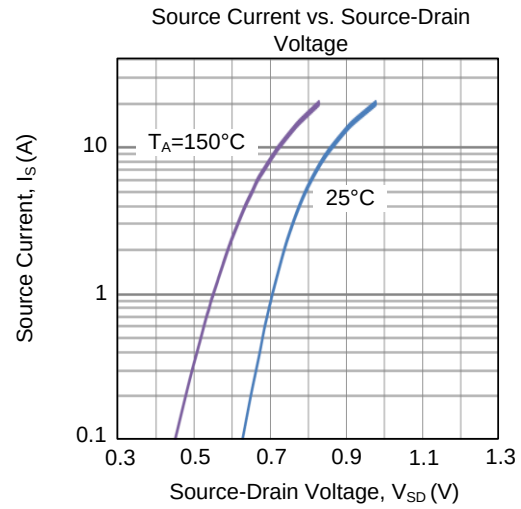
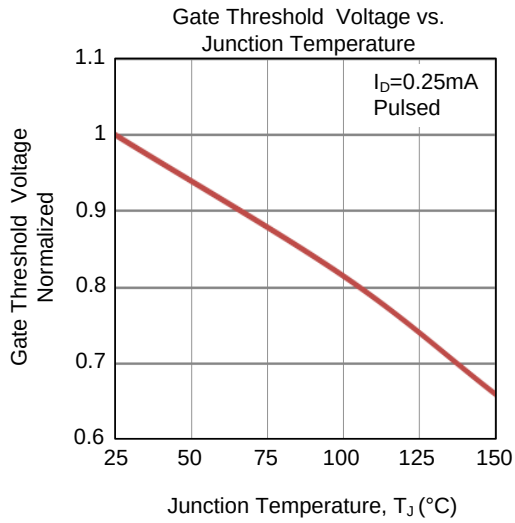


Unclamped Inductive Switching Waveforms

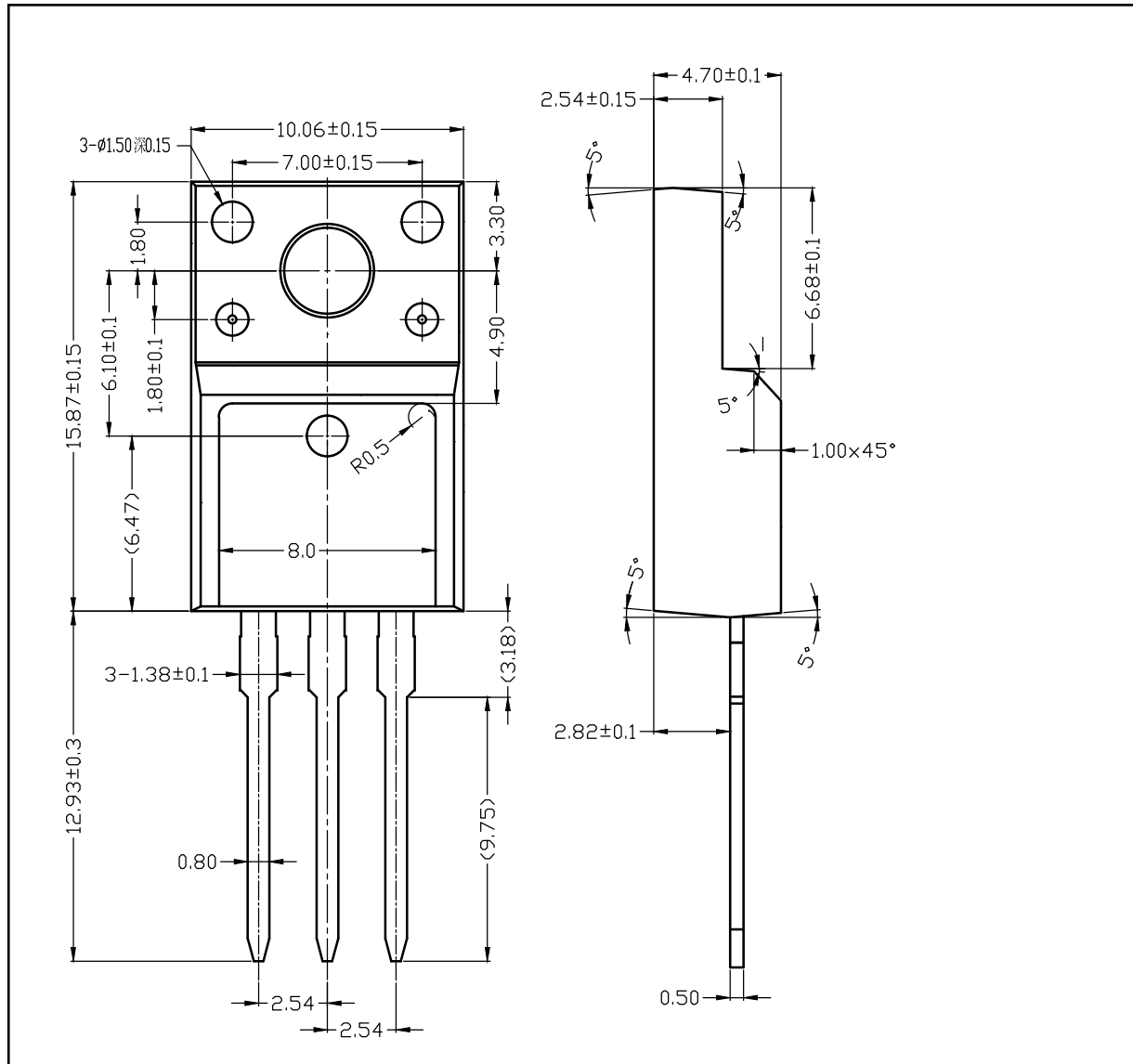
TYPICAL CHARACTERISTICS



TYPICAL CHARACTERISTICS(Cont.)



■ TO-220F-3L PACKAGE OUTLINE DIMENSIONS



■ TO-220-3L PACKAGE OUTLINE DIMENSIONS

