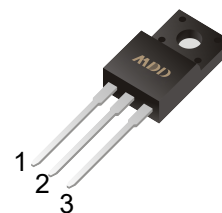


V_{DS}	600 V
$I_D(T_C=25^{\circ}C)$	7A
$R_{DS(on),typ}$	1.0Ω@ $V_{GS}=10V$
$Q_{g,typ}$	20.7nC

TO-220F-3L



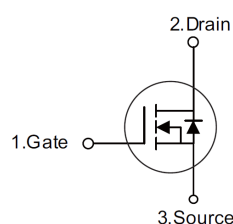
General Features

- Ultra low gate charge
- Low reverse transfer Capacitance
- Fast switching capability
- Avalanche energy tested
- Improved dv/dt capability, high ruggedness

Application

- High efficiency switch mode power supplies
- Electronic lamp ballasts based on half bridge
- LED power supplies

Equivalent Circuit



Absolute Maximum Ratings ($T_A=25^{\circ}C$ unless otherwise noted)

Parameter	Symbol	Value	Unit
Drain-Source Voltage	V_{DS}	600	V
Gate-Source Voltage	V_{GS}	±30	V
Continuous Drain Current	I_D	7	A
Pulsed Drain Current(Note 1)	I_{DM}	28	A
Continuous diode forward current	I_S	7	A
Diode pulse current	$I_{S,pulse}$	28	A
Peak Diode Recovery dv/dt (Note 3)	dv/dt	5	V/ns
Power Dissipation TO-220F	P_D	45	W
Power Dissipation TO-220/TO-252		120	W
Junction Temperature	T_J	150	°C
Storage Temperature	T_{stg}	-55 ~150	°C

Thermal Characteristics

Parameter	Symbol	Value	Unit
Thermal resistance, Junction-to-case	$R_{\theta JC}$	2.78	°C/W
Thermal resistance, Junction-to-ambient	$R_{\theta JA}$	62.5	°C/W

- Notes:**
1. Pulse width limited by maximum junction temperature.
 2. L=10mH, $I_{AS} = 8.4A$, Starting $T_J = 25^{\circ}C$.

Ta = 25°C unless otherwise specified

Symbol	Parameter		Condition	Min	Typ	Max	Unit
V_{(BR)DSS}	Drain-Source Breakdown Voltage		V_{GS}=0V, I_D=250μA	600	--	--	V
I_{GSS}	Gate-Source Leakage Current	Forward	V_{GS}=30V, V_{DS}=0V	--	--	100	nA
		Reverse	V_{GS}=-30V, V_{DS}=0V	--	--	-100	nA
I_{DSS}	Drain-Source Leakage Current		V_{DS}=600V, V_{GS}=0V	--	--	1	uA
V_{GS(TH)}	Gate Threshold Voltage		V_{DS}=V_{GS}, I_D=250μA	2.0	--	4.0	V
R_{DS(ON)}	Drain-Source On-State Resistance		V_{GS}=10V, I_D=1A	--	1.0	1.4	Ω

Dynamic Electrical Characteristics

Symbol	Parameter	Condition	Min	Typ	Max	Unit
C_{iss}	Input Capacitance	V_{DS}=25V V_{GS}=0V f=1MHz	--	760		pF
C_{oss}	Output Capacitance		--	101		pF
C_{rss}	Reverse Transfer Capacitance		--	6.1		pF
Q_g	Total Gate Charge	V_{DS}=480V, V_{GS}=10V, I_D=7A (Note1,2)	--	20.7	--	nC
Q_{gs}	Gate Source Charge		--	5.7	--	nC
Q_{gd}	Gate Drain Charge		--	7.2	--	nC

Switching Characteristics

Symbol	Parameter	Condition	Min	Typ	Max	Unit
t_{d(on)}	Turn on Delay Time	V_{DS}=300V, I_D=7A, R_G=10Ω (Note1,2)	--	--	15.2	ns
t_r	Turn on Rise Time		--	--	33.4	ns
t_{d(off)}	Turn Off Delay Time		--	--	53.6	ns
t_f	Turn Off Fall Time		--	--	31	ns

Source Drain Diode Characteristics

Symbol	Parameter	Condition	Min	Typ	Max	Unit
I_{SD}	Source drain current(Body Diode)		--	--	7	A
I_{SM}	Pulsed Current		--	--	28	A
V_{SD}	Drain-Source Diode Forward Voltage	I_S=7A, V_{GS}=0V	--	0.85	1.5	V
t_{rr}	Body Diode Reverse Recovery Time	V_R=300V I_F=7A, -diF/dt =100A/μs	--	480	--	ns
Q_{rr}	Body Diode Reverse Recovery Charge		--	2.1	--	uC

Notes:

- 1.Pulse test ; Pulse width≤300us, duty cycles≤2%.
- 2.Essentially independent of operating temperature.

Electrical Characteristics Diagrams

Figure 1. Typical Output Characteristics

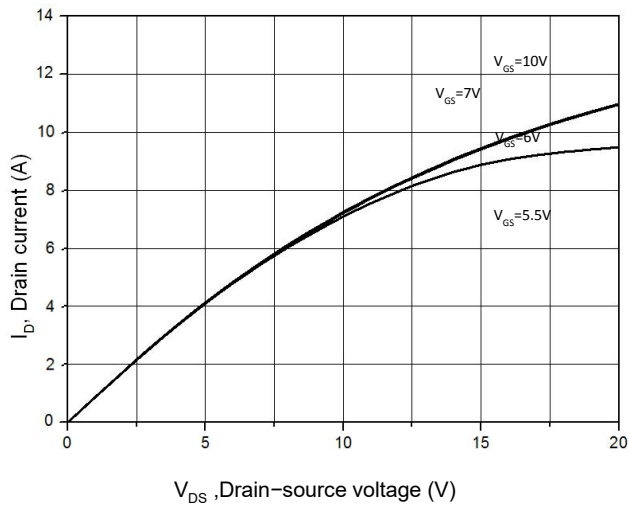


Figure 2. Transfer Characteristics

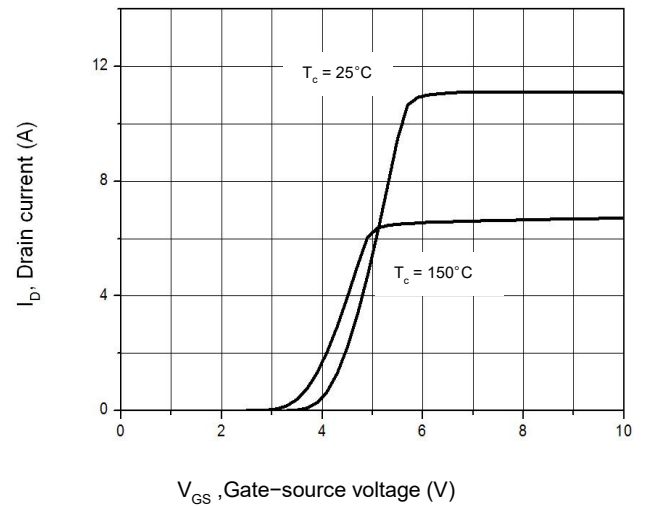


Figure 3. On-Resistance Variation vs. Drain Current

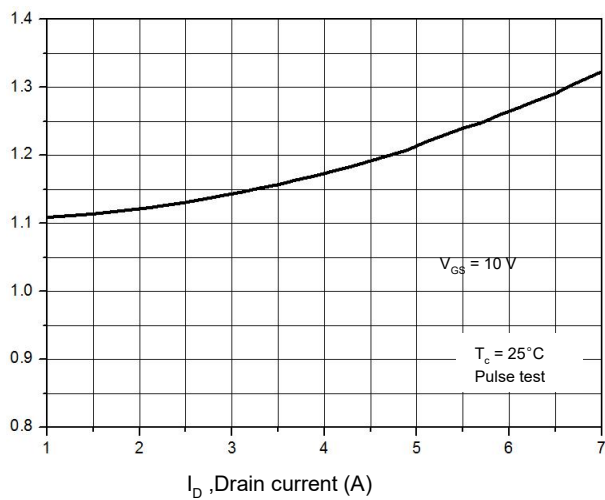


Figure 4. Threshold Voltage vs. Temperature

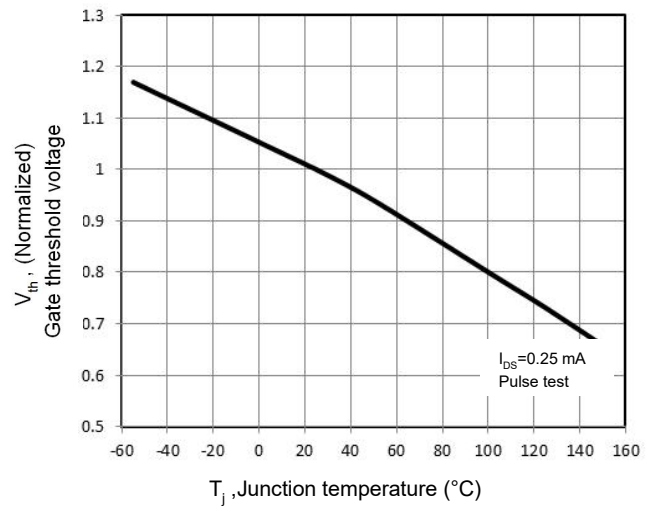


Figure 5. Breakdown Voltage vs. Temperature

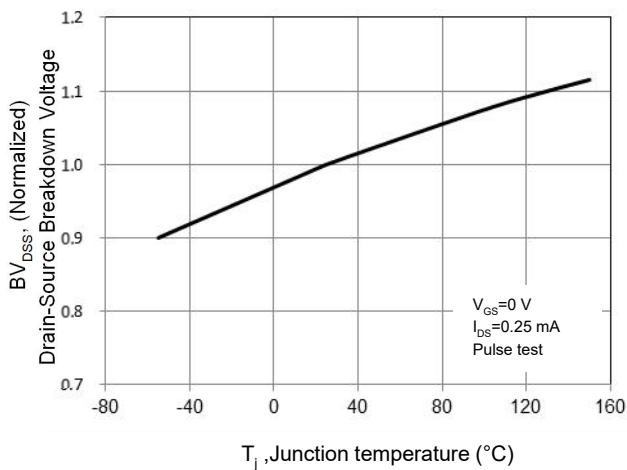


Figure 6. On-Resistance vs. Temperature

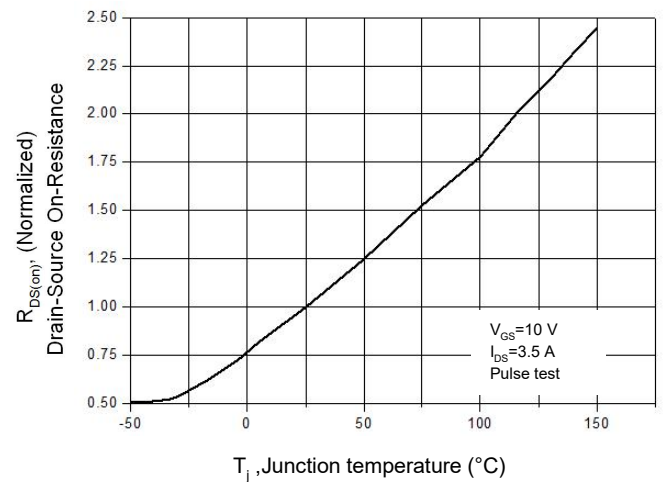


Figure 7. Capacitance Characteristics

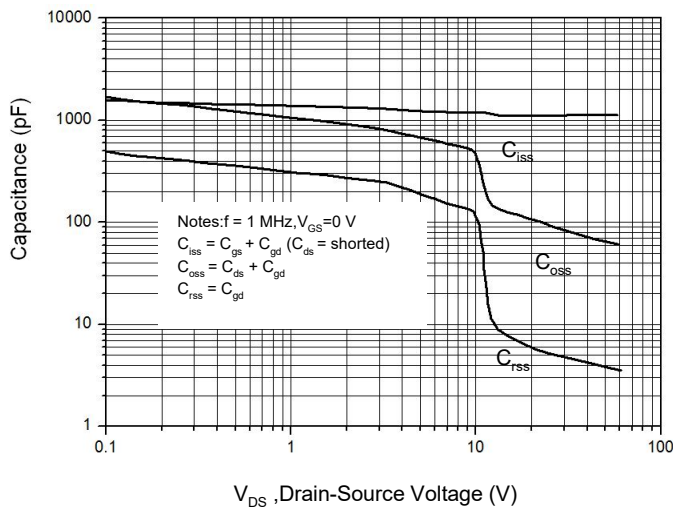


Figure 8. Gate Charge Characterist

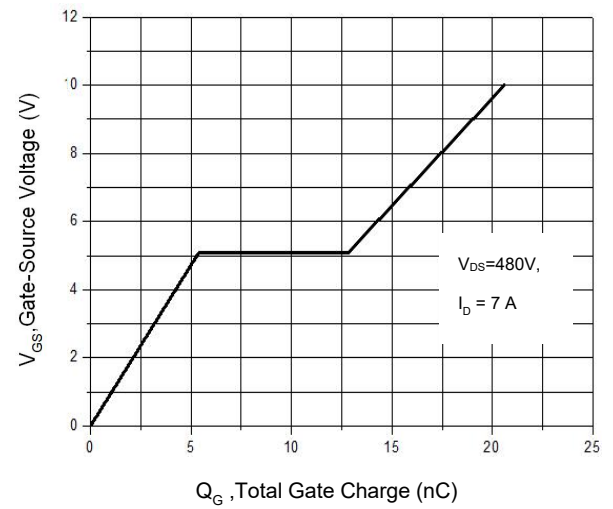


Figure9.MaximumSafeOperatingArea

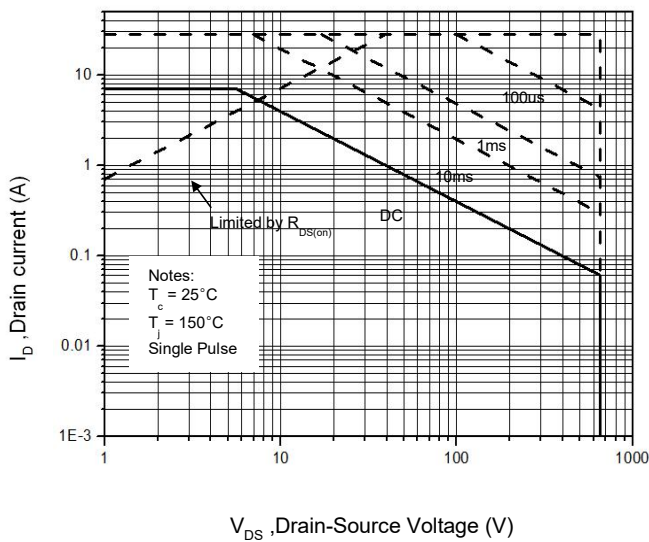


Figure 10. Power Dissipation vs. Temperature

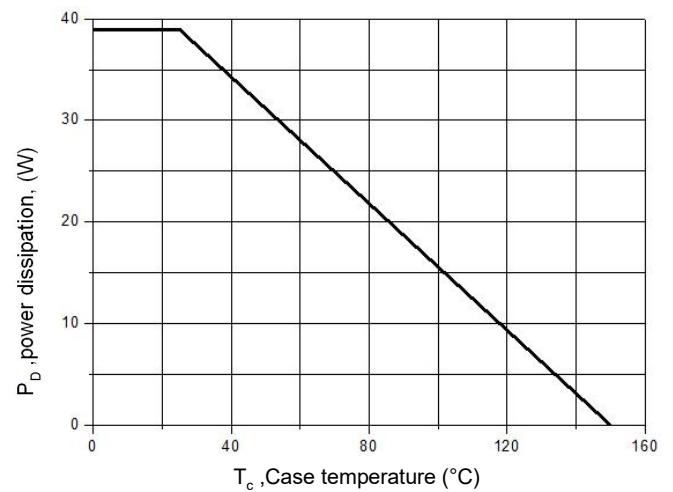


Figure 11. Continuous Drain Current vs. Temperature

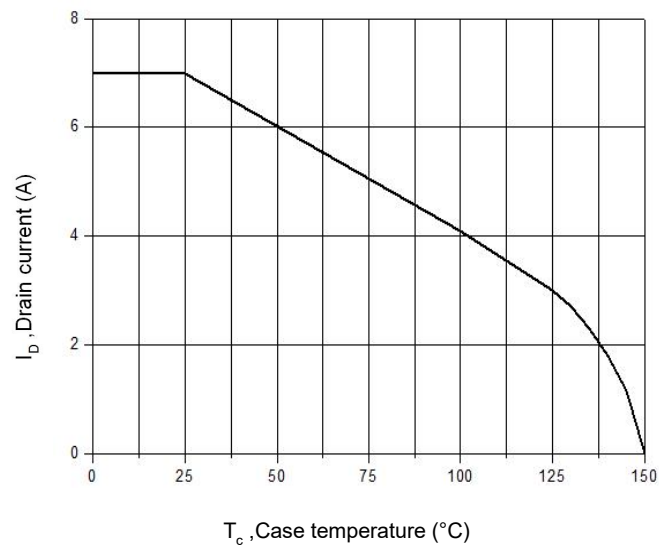


Figure 12. Body Diode Transfer Characteristics

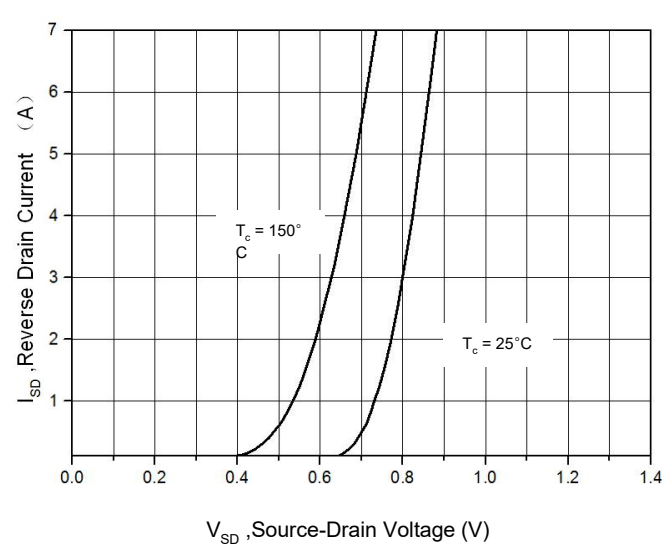
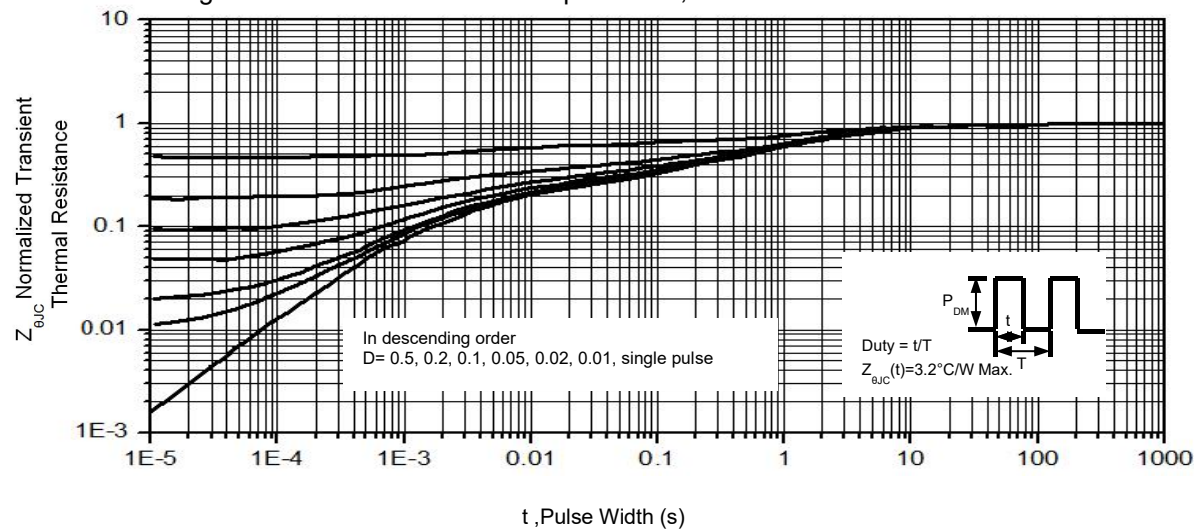
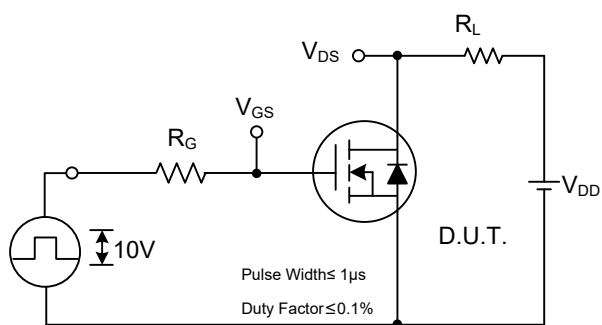
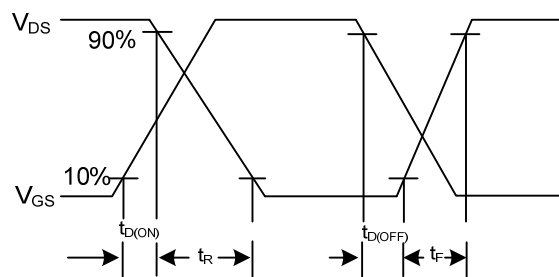


Figure 13 Transient Thermal Impedance,Junction to Case

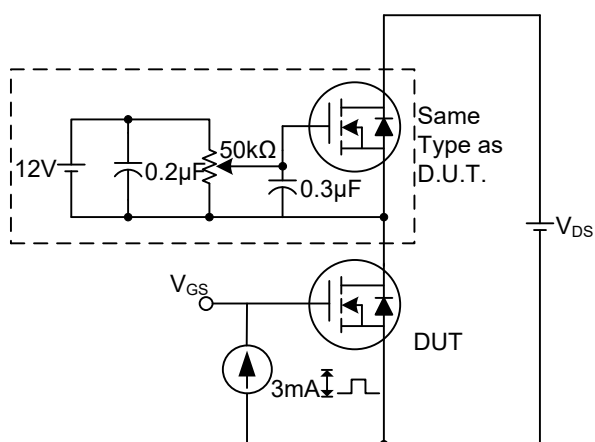




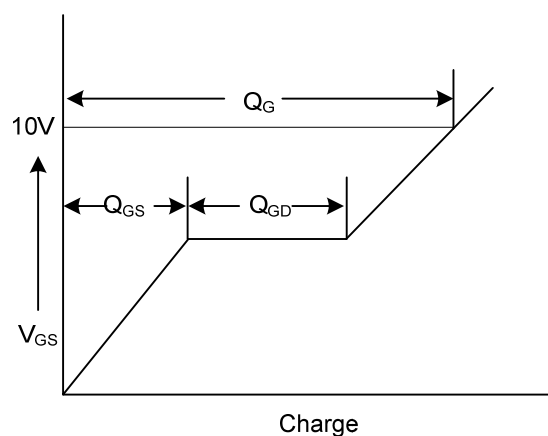
Switching Test Circuit



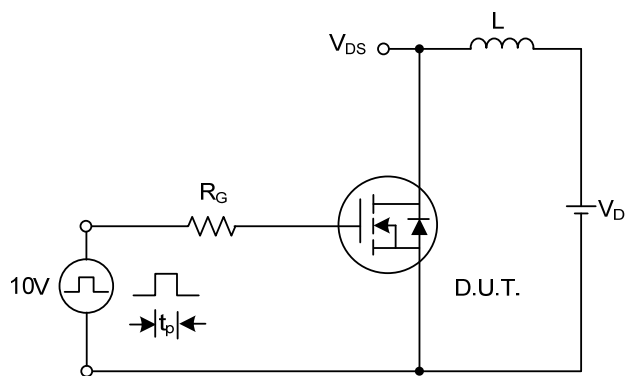
Switching Waveforms



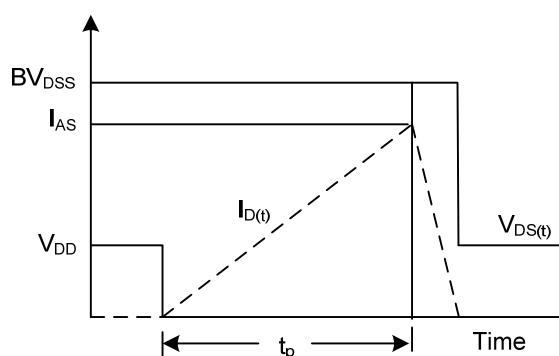
Gate Charge Test Circuit



Gate Charge Waveform



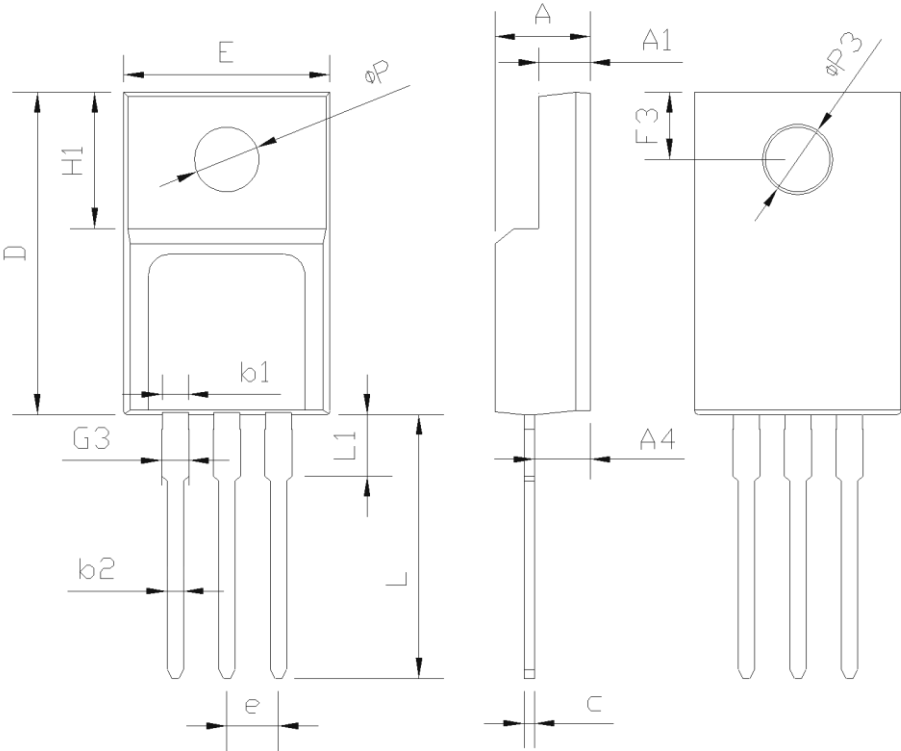
Unclamped Inductive Switching Test Circuit



Unclamped Inductive Switching Waveforms

The curve above is for reference only.

Mechanical Dimensions for TO-220F



SYMBOL	mm		
	MIN	NOM	MAX
E	9.96	10.16	10.36
A	4.50	4.70	4.90
A1	2.34	2.54	2.74
A4	2.56	2.76	2.96
c	0.40	0.50	0.65
D	15.57	15.87	16.17
H1	6.70REF		
e	2.54BSC		
L	12.68	12.98	13.28
L1	2.88	3.03	3.18
ΦP	3.03	3.18	3.38
ΦP3	3.15	3.45	3.65
F3	3.15	3.30	3.45
G3	1.25	1.35	1.55
b1	1.18	1.28	1.43
b2	0.70	0.80	0.95

Important Notice and Disclaimer

Microdiode Electronics (Shenzhen) reserves the right to make changes to this document and its products and specifications at any time without notice. Customers should obtain and confirm the latest product information and specifications before final design, purchase or use.

Microdiode Electronics (Shenzhen) makes no warranty, representation or guarantee regarding the suitability of its products for any particular purpose, nor does Microdiode Electronics (Shenzhen) assume any liability for application assistance or customer product design. Microdiode Electronics (Shenzhen) does not warrant or accept any liability with products which are purchased or used for any unintended or unauthorized application.

No license is granted by implication or otherwise under any intellectual property rights of Microdiode Electronics (Shenzhen).

Microdiode Electronics (Shenzhen) products are not authorized for use as critical components in life support devices or systems without express written approval of Microdiode Electronics (Shenzhen).