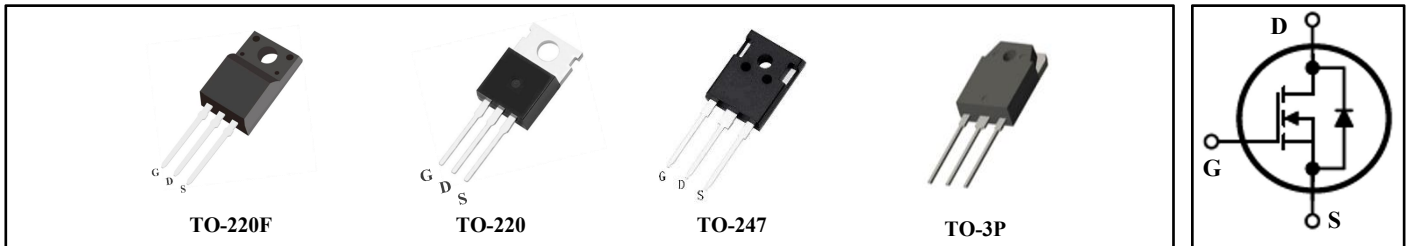


FEATURES

- BV_{DSS} : 500V, $I_D=20A$
- $R_{DS(on)}$: $0.3\Omega(\text{Max}) @ V_{GS}=10V$
- Very Low FOM ($R_{DS(on)} * Q_g$)
- Excellent stability and uniformity

APPLICATIONS

- Switch Mode Power Supply (SMPS)
- Uninterruptible Power Supply (UPS)
- Power Factor Correction (PFC)
- AC to DC Converters



Ordering Information

Type NO.	Marking	Package Code
MPVA20N50B	MPVA20N50B	TO-220F
MPVP20N50B	MPVP20N50B	TO-220
MPVW20N50B	MPVW20N50B	TO-247
MPVT20N50B	MPVT20N50B	TO-3P

Absolute Maximum Ratings $T_C = 25^\circ\text{C}$, unless otherwise noted

Parameter	Symbol	Value		Unit
		220F	220-247-3P	
Drain-Source Voltage ($V_{GS} = 0V$)	V_{DSS}	500		V
Continuous Drain Current	I_D	20		A
Pulsed Drain Current (note1)	I_{DM}	72		A
Gate-Source Voltage	V_{GSS}	± 30		V
Single Pulse Avalanche Energy (note2)	E_{AS}	1000		mJ
Avalanche Current (note1)	I_{AR}	12		A
Repetitive Avalanche Energy (note1)	E_{AR}	64		mJ
Power Dissipation ($T_C = 25^\circ\text{C}$)	P_D	98	210	W
Operating Junction and Storage Temperature Range	T_J, T_{stg}	$-55 \sim +150$		$^\circ\text{C}$

Thermal Resistance

Parameter	Symbol	Value		Unit
		220F	220-247-3P	
Thermal Resistance, Junction-to-Case	R_{thJC}	1.27	0.6	$^\circ\text{C/W}$
Thermal Resistance, Junction-to-Ambient	R_{thJA}	62.5	60.0	

Specifications T _J = 25°C, unless otherwise noted						
Parameter	Symbol	Test Conditions	Value			Unit
			Min.	Typ.	Max.	
Static						
Drain-Source Breakdown Voltage	V _{(BR)DSS}	V _{GS} = 0V, I _D = 250μA	500	--	--	V
Zero Gate Voltage Drain Current	I _{DSS}	V _{DS} = 500V, V _{GS} = 0V, T _J = 25°C	--	--	1	μA
Gate-Source Leakage	I _{GSS}	V _{GS} = ±30V	--	--	±100	nA
Gate-Source Threshold Voltage	V _{GS(th)}	V _{DS} = V _{GS} , I _D = 250μA	3.0	--	4.0	V
Drain-Source On-Resistance (Note4)	R _{DS(on)}	V _{GS} = 10V, I _D = 10.0A	--	0.24	0.30	Ω
Dynamic						
Input Capacitance	C _{iss}	V _{GS} = 0V, V _{DS} = 25V, f = 1.0MHz	--	3000	--	pF
Output Capacitance	C _{oss}		--	221	--	
Reverse Transfer Capacitance	C _{rss}		--	16	--	
Total Gate Charge	Q _g	V _{DD} = 400V, I _D = 20.0A, V _{GS} = 10V	--	75	--	nC
Gate-Source Charge	Q _{gs}		--	10	--	
Gate-Drain Charge	Q _{gd}		--	31	--	
Turn-on Delay Time	t _{d(on)}	V _{DD} =250V, I _D = 20.0A, R _G = 25Ω	--	35	--	ns
Turn-on Rise Time	t _r		--	40	--	
Turn-off Delay Time	t _{d(off)}		--	160	--	
Turn-off Fall Time	t _f		--	55	--	
Drain-Source Body Diode Characteristics						
Continuous Body Diode Current	I _S	T _C = 25°C	--	--	20	A
Pulsed Diode Forward Current	I _{SM}		--	--	80	
Body Diode Voltage	V _{SD}	T _J = 25°C, I _{SD} = 20.0A, V _{GS} = 0V	--	--	1.4	V
Reverse Recovery Time	t _{rr}	V _{GS} = 0V, I _F = 20.0A, di _F /dt = 100A/μs	--	430	--	ns
Reverse Recovery Charge	Q _{rr}		--	6.5	--	μC

Notes

1. Repetitive Rating: Pulse width limited by maximum junction temperature
2. $I_{AS} = 12A, V_{DD} = 50V, R_G = 25\Omega$, Starting $T_J = 25^{\circ}\text{C}$
3. Pulse Test: Pulse width $\leq 300\mu s$, Duty Cycle $\leq 1\%$
4. Essentially independent of operating temperature

Typical Characteristics $T_J = 25^\circ\text{C}$, unless otherwise noted

Figure 1. Output Characteristics

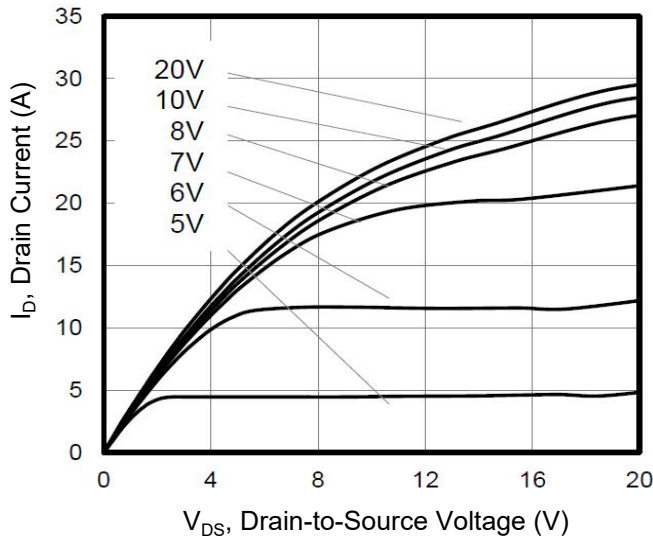


Figure 2. Transfer Characteristics

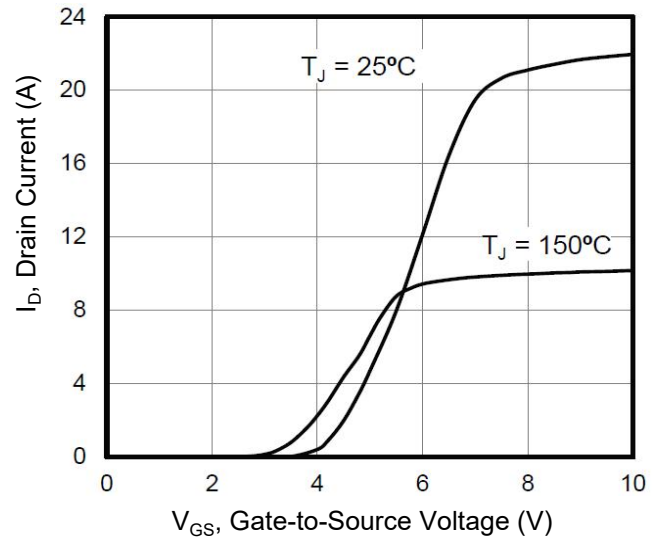


Figure 3. Drain Current vs. Temperature

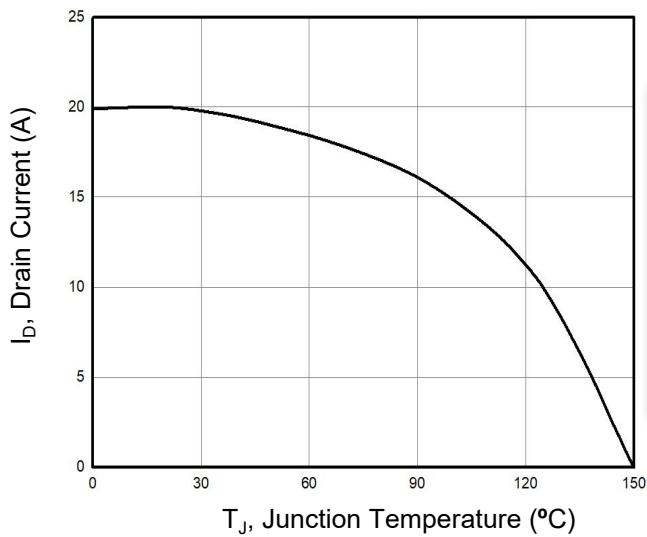


Figure 4. Capacitance

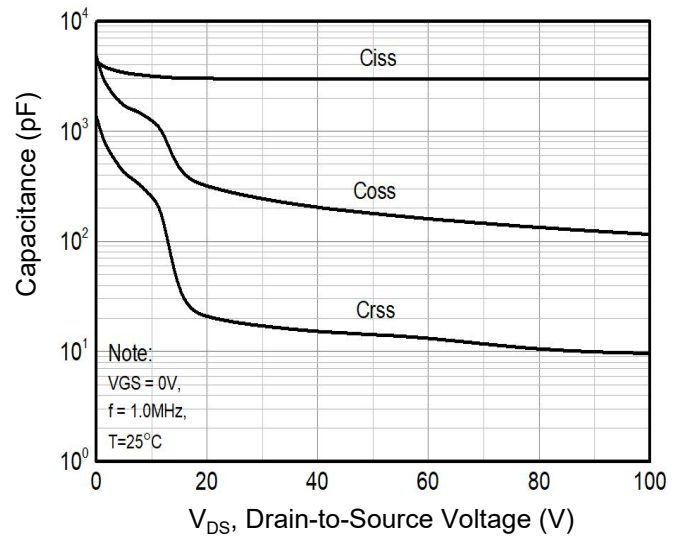


Figure 5. Gate Charge

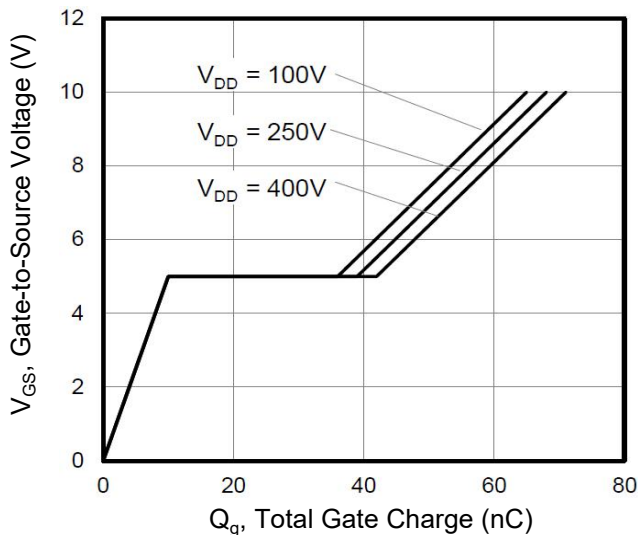
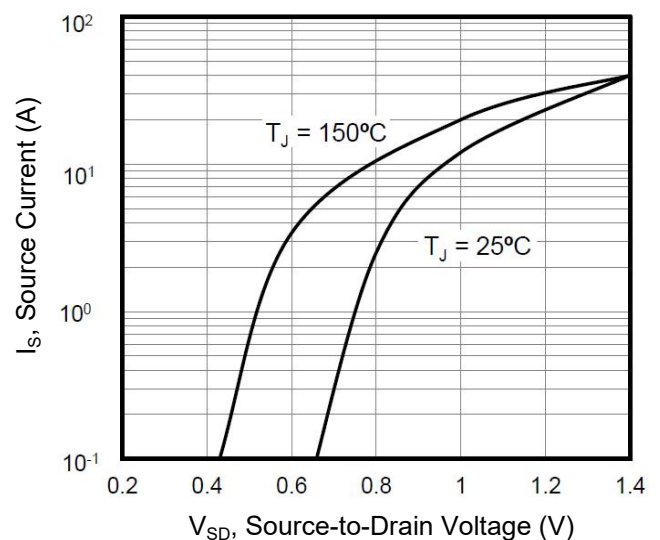


Figure 6. Body Diode Forward Voltage



Typical Characteristics $T_J = 25^\circ\text{C}$, unless otherwise noted

Figure 7. On-Resistance vs. Temperature

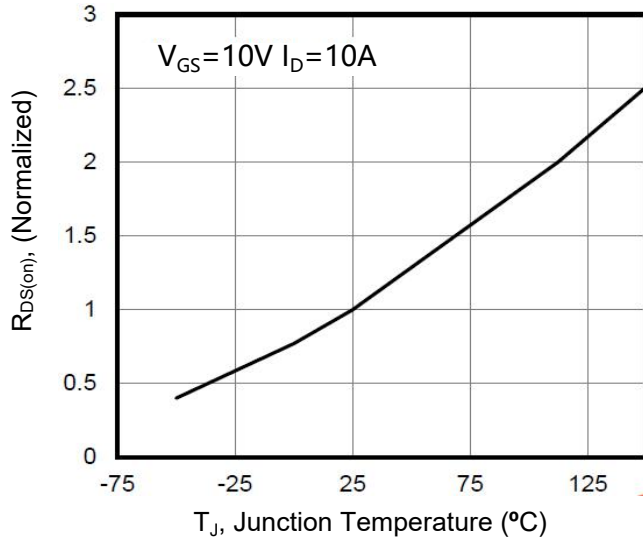


Figure 8. BV_{DSS} vs. Temperature

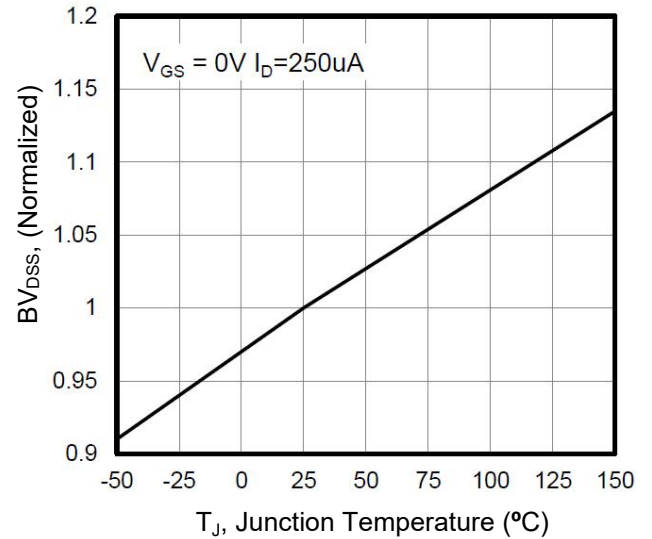


Figure 9. Transient Thermal Impedance
(TO-220F)

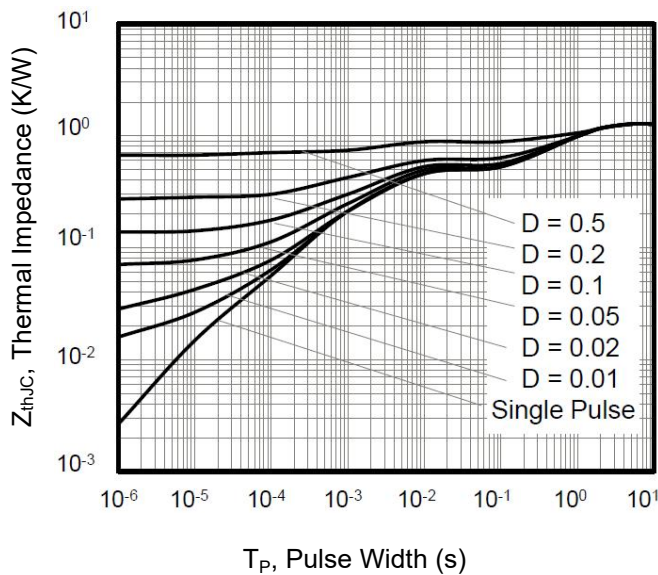


Figure 10. Transient Thermal Impedance
(TO-220 TO-247 TO-3P)

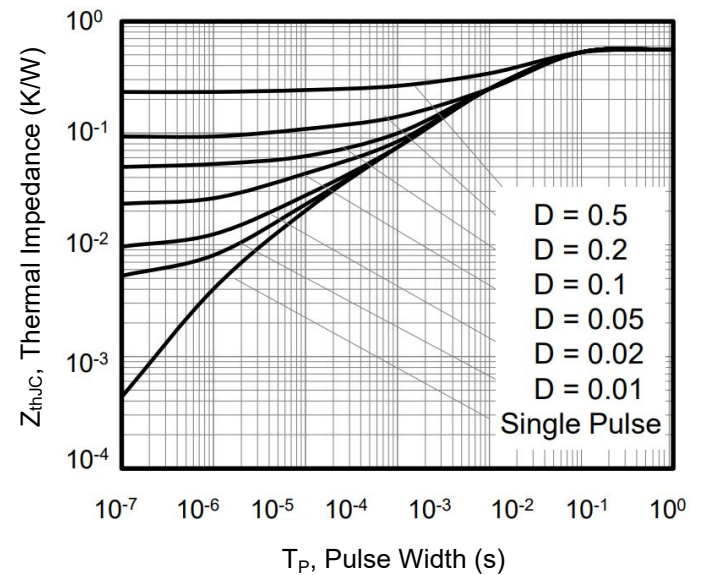


Figure A: Gate Charge Test Circuit and Waveform

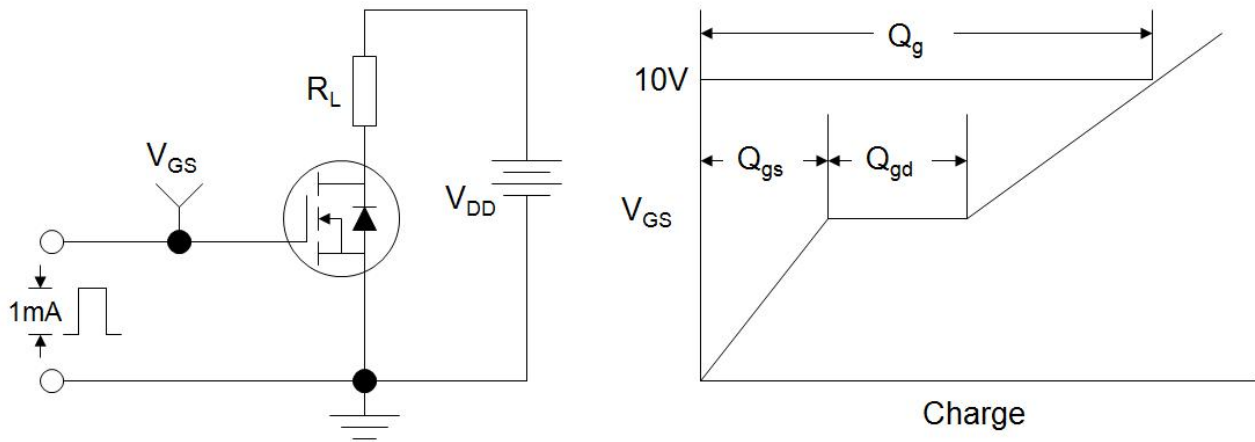


Figure B: Resistive Switching Test Circuit and Waveform

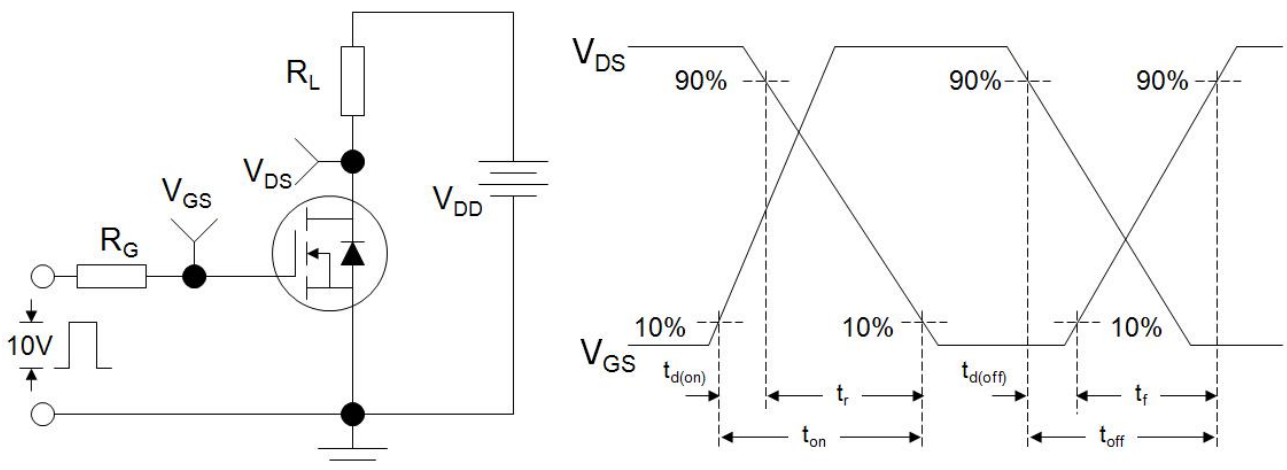
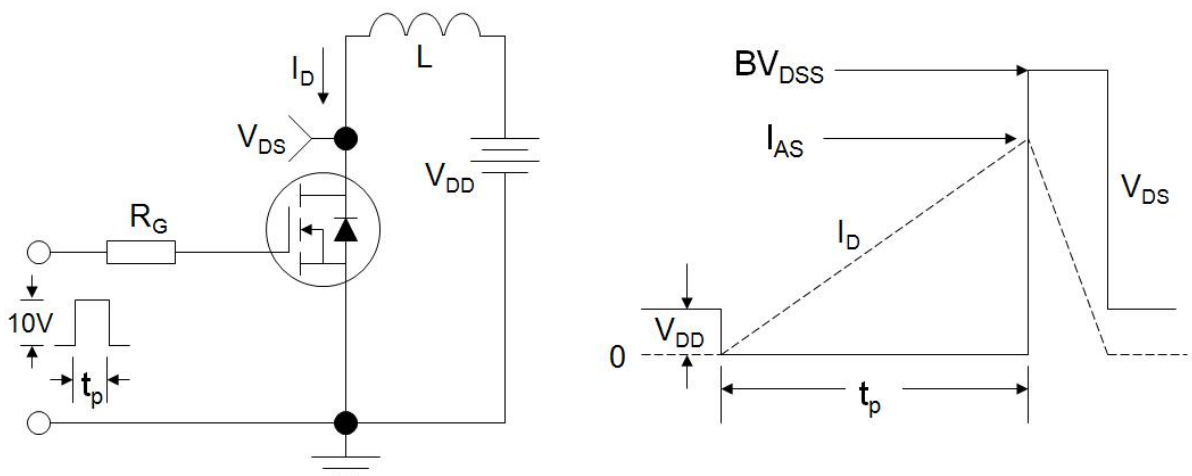


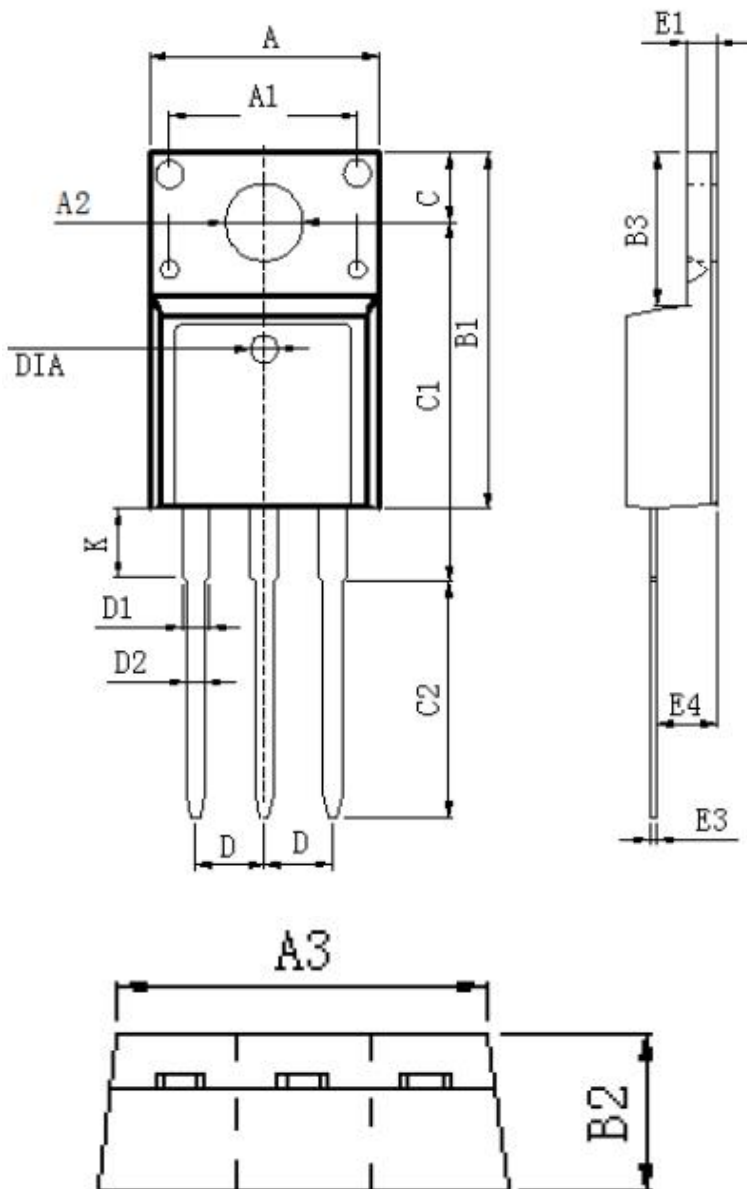
Figure C: Unclamped Inductive Switching Test Circuit and Waveform



Outline Dimension

Unit: mm

TO-220F



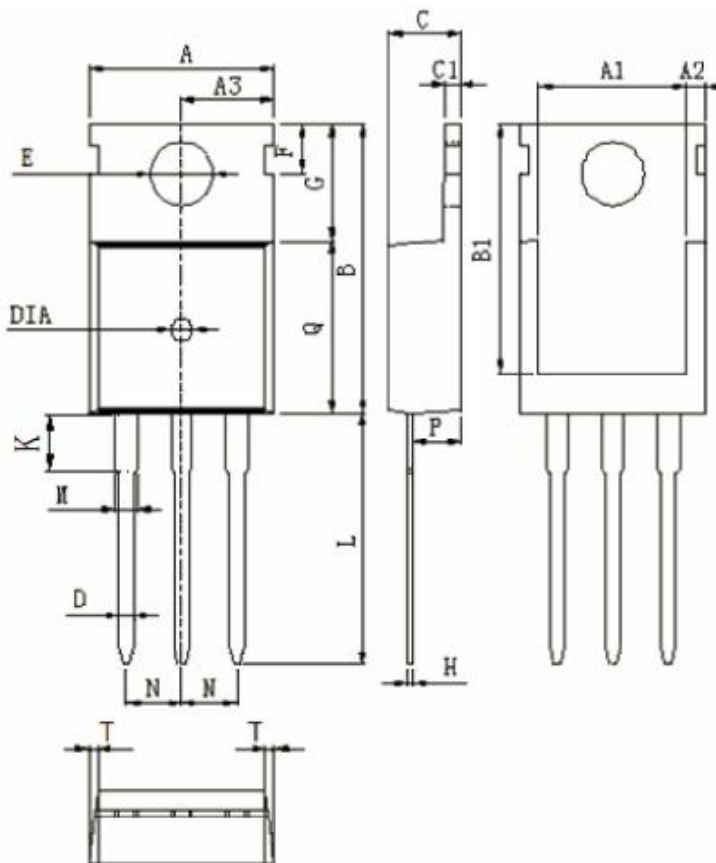
DIM	MILLIMETERS
A	10.16 ± 0.3
A1	7.00 ± 0.1
A2	3.3 ± 0.2
A3	9.5 ± 0.2
B1	15.87 ± 0.3
B2	4.7 ± 0.2
B3	6.68 ± 0.4
C	3.3 ± 0.2
C1	12.57 ± 0.3
C2	10.02 ± 0.5
D	2.54 ± 0.05
D1	1.28 ± 0.2
D2	0.8 ± 0.1
K	3.1 ± 0.3
E1	2.54 ± 0.1
E3	0.5 ± 0.1
E4	2.76 ± 0.2
DIA	$\odot 1.5$ (deep 0.2)

Unit :mm

Outline Dimension

Unit: mm

TO-220



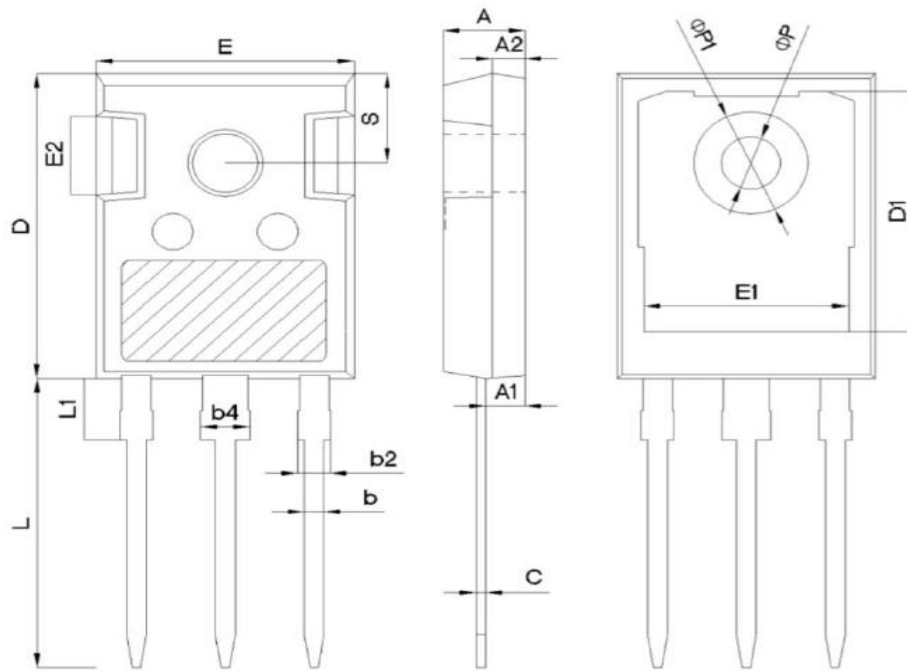
DIM	MILLIMETERS
A	10.0 ± 0.3
A1	8.64 ± 0.2
A2	1.15 ± 0.1
A3	5.0 ± 0.2
B	15.8 ± 0.4
B1	13.2 ± 0.3
C	4.56 ± 0.1
C1	1.3 ± 0.2
D	0.8 ± 0.2
E	3.6 ± 0.2
F	2.95 ± 0.3
G	6.5 ± 0.3
H	0.5 ± 0.1
K	3.1 ± 0.2
L	13.2 ± 0.4
M	1.25 ± 0.1
N	2.54 ± 0.1
P	2.4 ± 0.3
Q	9.0 ± 0.3
T	W:0.35
DIA	$\odot 1.5$ (deep 0.2)

Unit :mm

Outline Dimension

Unit: mm

TO-247



SYMBOL	mm		
	MIN	NOM	MAX
A	4.80	5.00	5.20
A1	2.21	2.41	2.61
A2	1.85	2.00	2.15
b	1.11	1.21	1.36
b2	1.91	2.01	2.21
b4	2.91	3.01	3.21
c	0.51	0.61	0.75
D	20.70	21.00	21.30
D1	16.25	16.55	16.85
E	15.50	15.80	16.10
E1	13.00	13.30	13.60
E2	4.80	5.00	5.20
E3	2.30	2.50	2.70
e	5.44BSC		
L	19.62	19.92	20.22
L1	-	-	4.30
ΦP	3.40	3.60	3.80
ΦP1	-	-	7.30
S	6.15BSC		

Outline Dimension

Unit: mm

TO-3P

