

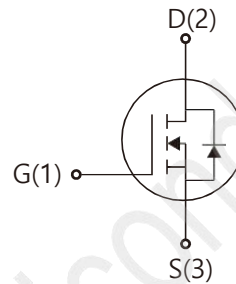
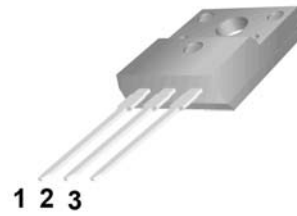


WGF65R099G

**Features**

- CRM(CQ) Super\_Junction technology
- Much lower Ron\*A performance for On-state efficiency
- Much lower FOM for fast switching efficiency

TO-220F



- 1.Gate (G)
- 2.Drain (D)
- 3.Source (S)

**Absolute Maximum Ratings**

Parameter	Symbol	Value	Unit
Drain-source voltage	$V_{DS}$	650	V
Continuous drain current $T_C = 25^\circ\text{C}$ $T_C = 100^\circ\text{C}$	$I_D$	35 20	A
Pulsed drain current ( $T_C = 25^\circ\text{C}$ , $t_p$ limited by $T_{jmax}$ )	$I_{D\ pulse}$	140	A
Avalanche energy, single pulse ( $L=60\text{mH}$ , $R_g=30\ \Omega$ )	$E_{AS}$	480	mJ
Gate-Source voltage	$V_{GS}$	$\pm 30$	V
Power dissipation ( $T_C = 25^\circ\text{C}$ )	$P_{tot}$	26	W
Operating junction and storage temperature	$T_j, T_{stg}$	-55...+150	$^\circ\text{C}$

**Thermal Resistance**

Parameter	Symbol	Value			Unit	Test Condition
		min.	typ.	max.		
Thermal resistance, junction – case. Max	RthJC	-	3.38	4.73	°C/W	
Thermal resistance, junction – ambient. Max	RthJA	-	-	64	°C/W	

**Electrical Characteristic (at Tj = 25 °C, unless otherwise specified)**

Parameter	Symbol	Value			Unit	Test Condition
		min.	typ.	max.		

**Static Characteristic**

Drain-source breakdown voltage	BV <sub>DSS</sub>	650	-	-	V	V <sub>GS</sub> =0V, I <sub>D</sub> =250uA
Gate threshold voltage	V <sub>GS(th)</sub>	3.4	-	4.8	V	V <sub>DS</sub> =V <sub>GS</sub> , I <sub>D</sub> =250uA
Zero gate voltage drain current	I <sub>DSS</sub>	-	-	5	μA	V <sub>DS</sub> =650V, V <sub>GS</sub> =0V T <sub>C</sub> =25°C T <sub>C</sub> =150°C
		-	800	-		
Gate-source leakage current	I <sub>GSS</sub>	-	-	±100	nA	V <sub>GS</sub> =±30V, V <sub>DS</sub> =0V
Drain-source on-state resistance	R <sub>DS(on)</sub>	-	90	103	mΩ	V <sub>GS</sub> =10V, I <sub>D</sub> =17A, T <sub>C</sub> =25°C T <sub>C</sub> =150°C
		-	235	-		
Transconductance	g <sub>fs</sub>	-	18.8	-	S	V <sub>DS</sub> =20V, I <sub>D</sub> =17A

**Dynamic Characteristic**

Input Capacitance	C <sub>iss</sub>	-	2040	-	pF	V <sub>GS</sub> =0V, V <sub>DS</sub> =100V, f=1MHz
Output Capacitance	C <sub>oss</sub>	-	130	-		
Reverse Transfer Capacitance	C <sub>rss</sub>	-	37	-		
Gate Total Charge	Q <sub>G</sub>	-	57	-	nC	V <sub>GS</sub> =10V, V <sub>DS</sub> =480V, I <sub>D</sub> =17A, f=1MHz
Gate-Source charge	Q <sub>gs</sub>	-	19.5	-		
Gate-Drain charge	Q <sub>gd</sub>	-	30	-		
Turn-on delay time	t <sub>d(on)</sub>	-	63.4	-	ns	T <sub>j</sub> =25°C, V <sub>GS</sub> =10V, I <sub>D</sub> =17A, V <sub>DS</sub> =400V, R <sub>g</sub> =27Ω
Rise time	t <sub>r</sub>	-	106	-		
Turn-off delay time	t <sub>d(off)</sub>	-	132	-		
Fall time	t <sub>f</sub>	-	30	-		
Gate resistance	R <sub>G</sub>	-	0.9	-	Ω	V <sub>GS</sub> =0V, V <sub>DS</sub> =0V, f=1MHz

**Body Diode Characteristic**

Parameter	Symbol	Value			Unit	Test Condition
		min.	typ.	max.		
Body Diode Forward Voltage	$V_{SD}$	0.7	0.9	1.2	V	$V_{GS}=0V, I_{SD}=17A$
Body Diode Reverse Recovery Time	$t_{rr}$	-	140	-	ns	$I_{sd}=17A$ $dI/dt=100A/\mu s, V_{ds}=400V$
Body Diode Reverse Recovery Charge	$Q_{rr}$	-	0.89	-	$\mu C$	

Typical Performance Characteristics

Fig 1. Output Characteristics (Tj=25°C)

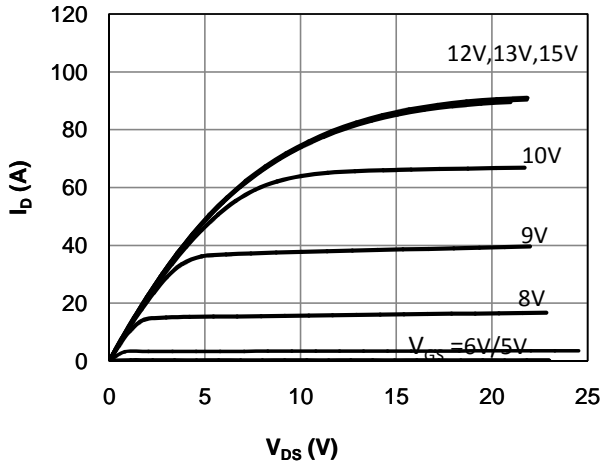


Fig 2. Output Characteristics (Tj=150°C)

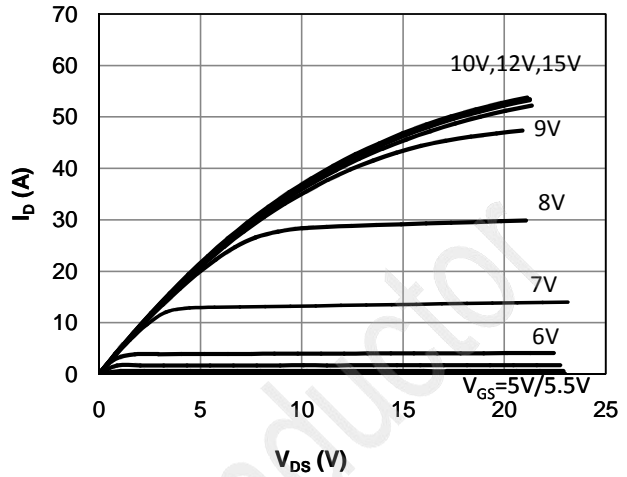


Fig 3: Transfer Characteristics

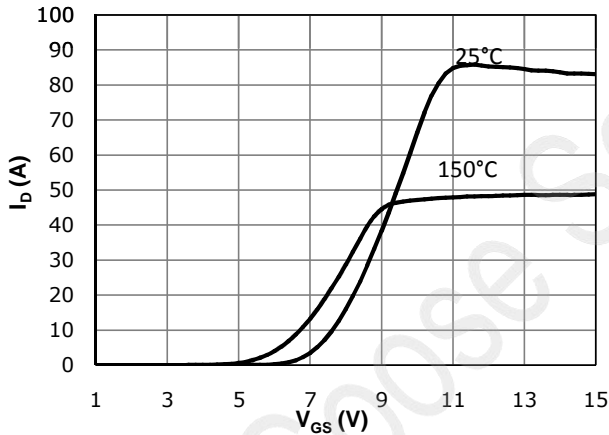


Fig 4:  $V_{TH}$  Vs Tj Temperature Characteristics

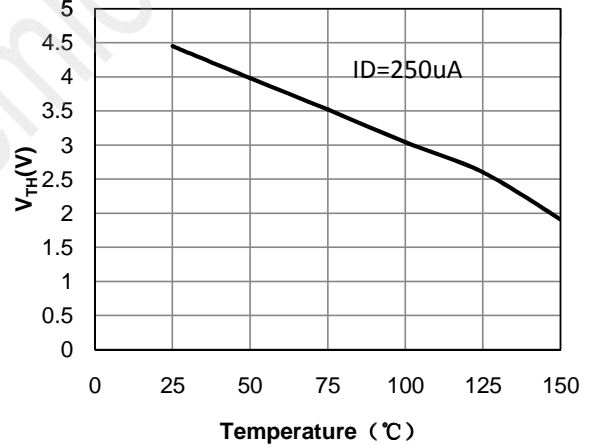


Fig 5:  $R_{DS(on)}$  Vs  $I_{DS}$  Characteristics (Tc=25°C)

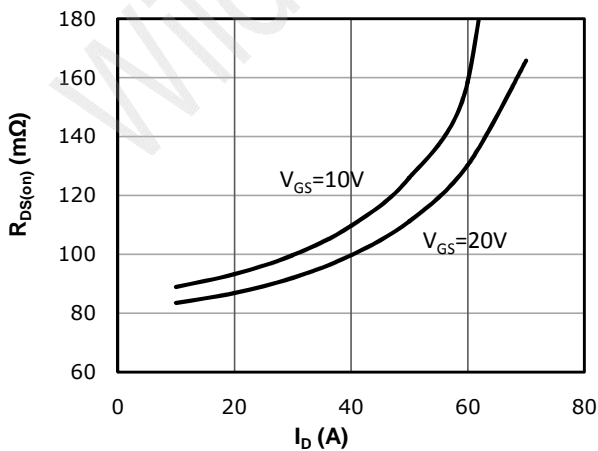


Fig 6:  $R_{DS(on)}$  vs. Temperature

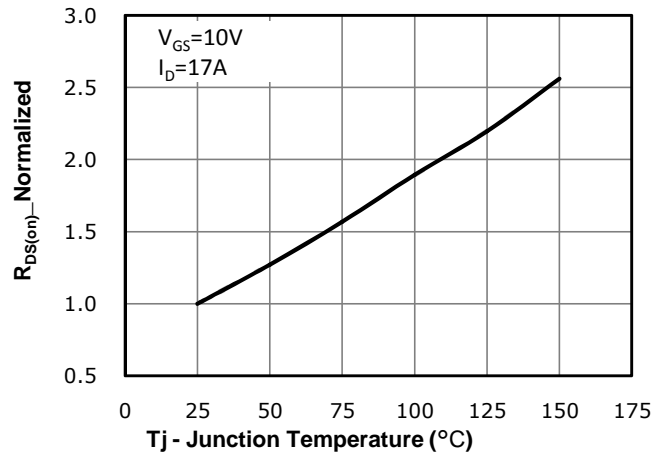


Fig 7: BVDSS vs. Temperature

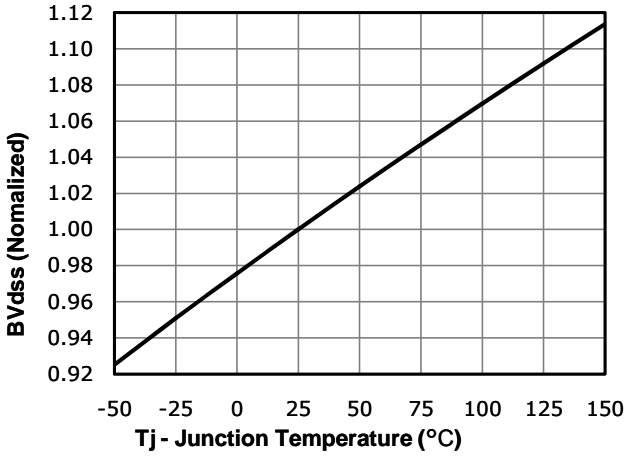


Fig 8: Rds(on) vs Gate Voltage

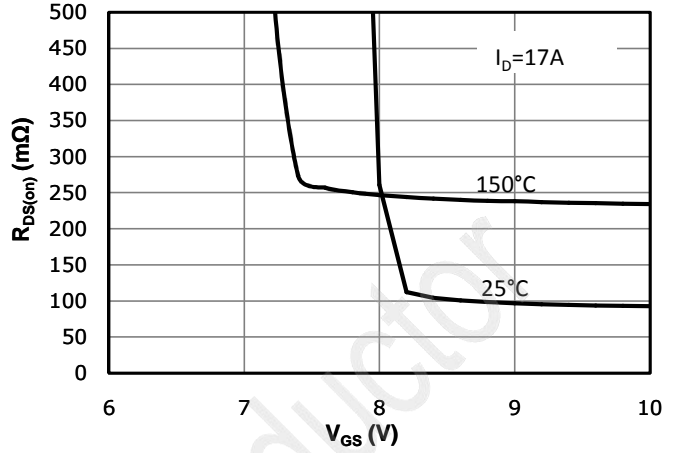


Fig 9: Body-diode Forward Characteristics

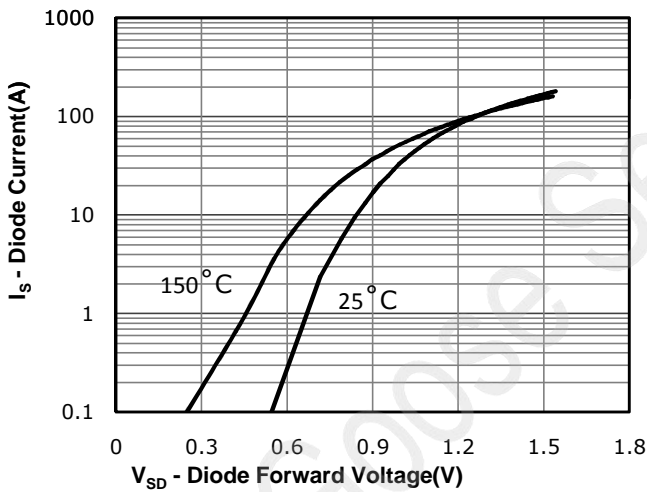


Fig 10: Gate Charge Characteristics

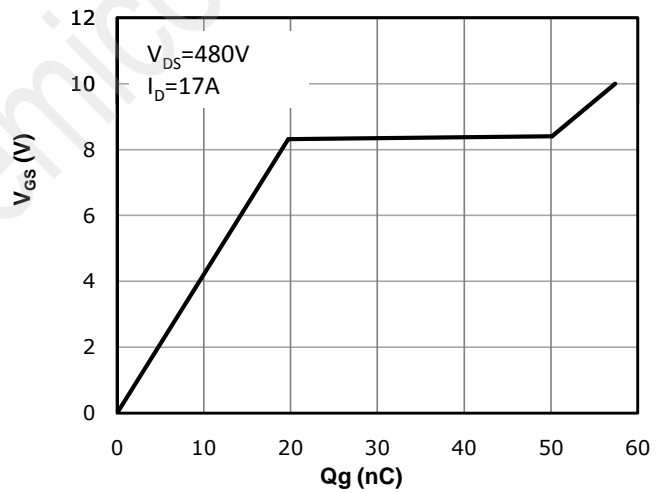


Fig 11: Capacitance Characteristics

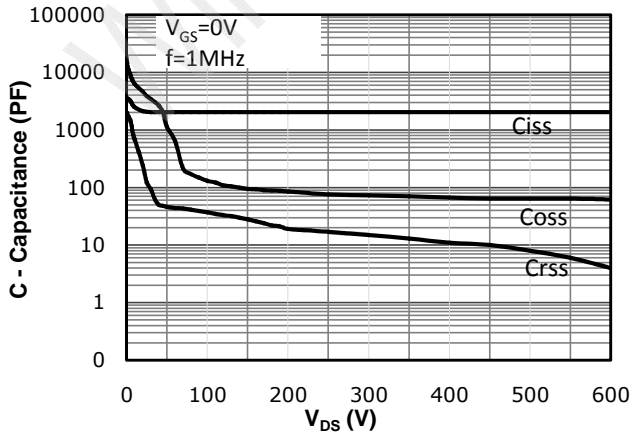


Fig 12: Safe Operating Area

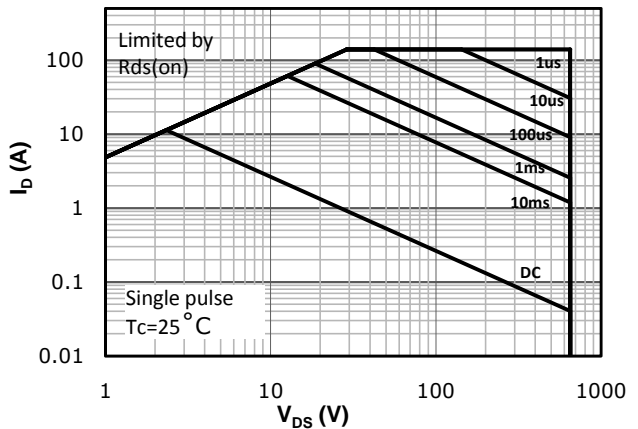
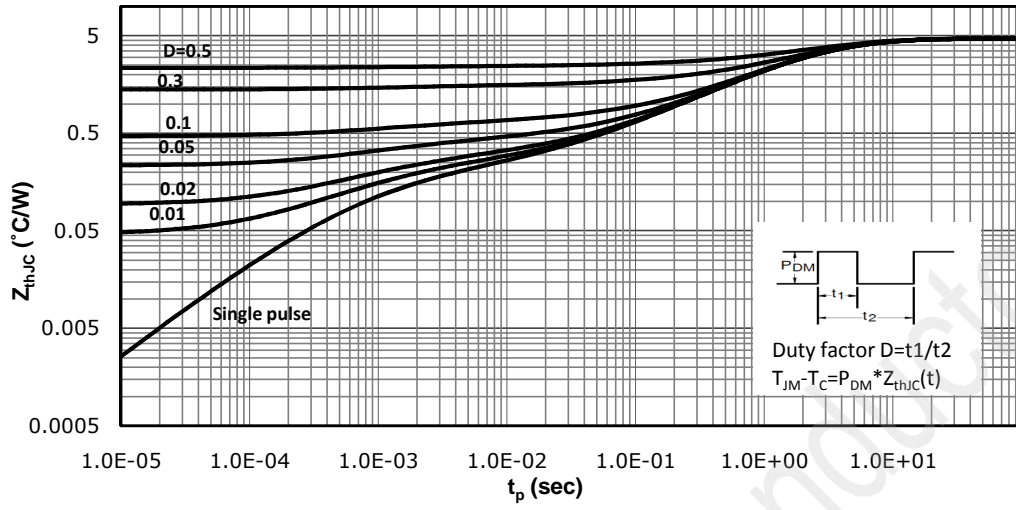
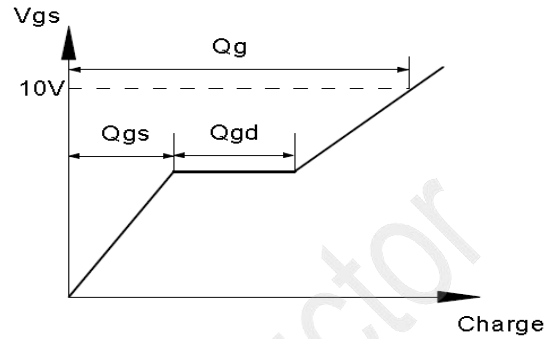
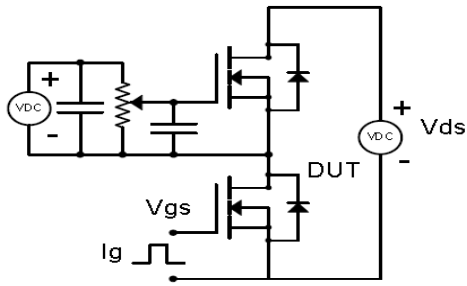


Fig 13: Max. Transient Thermal Impedance

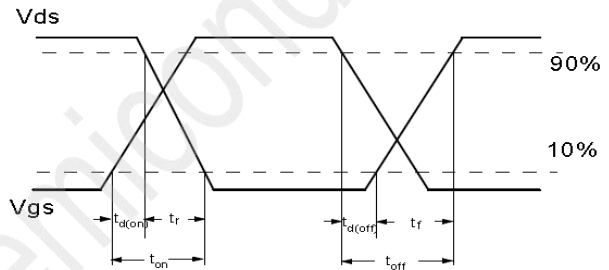
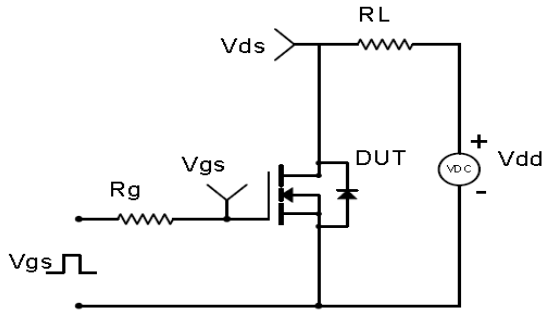


**Test Circuit & Waveform**

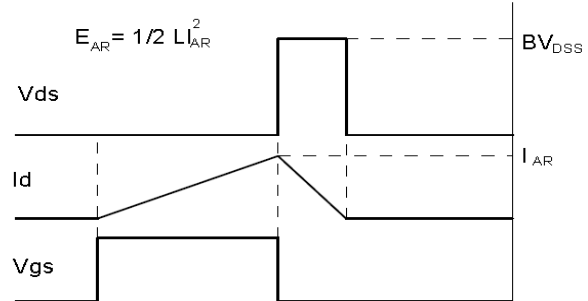
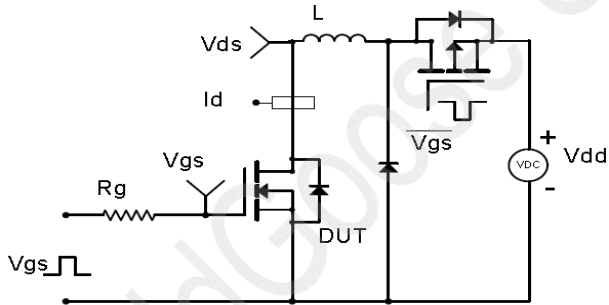
Gate Charge Test Circuit & Waveform



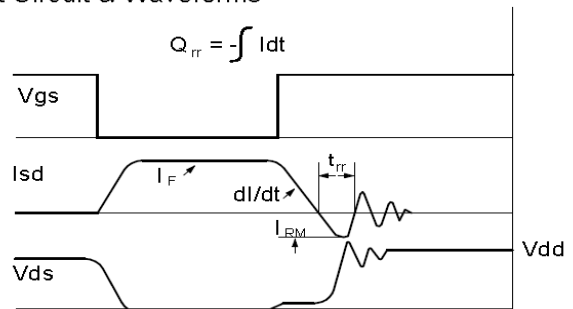
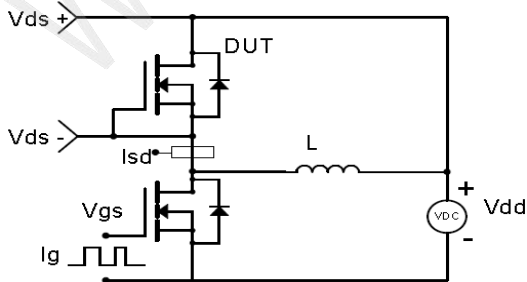
Resistive Switching Test Circuit & Waveforms



Unclamped Inductive Switching (UIS) Test Circuit & Waveforms



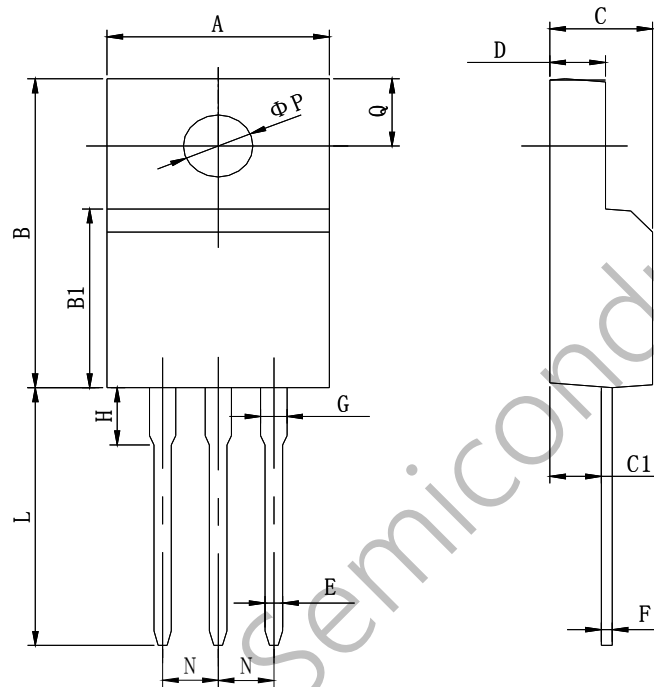
Diode Recovery Test Circuit & Waveforms



Package Dimension

## TO-220F

Unit: mm



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	9.60	10.40	0.378	0.409
B	15.40	16.20	0.606	0.638
B1	8.90	9.50	0.350	0.374
C	4.30	4.90	0.169	0.193
C1	2.10	3.00	0.083	0.118
D	2.40	3.00	0.094	0.118
E	0.60	1.00	0.024	0.039
F	0.30	0.60	0.012	0.024
G	1.12	1.42	0.044	0.056
H	3.40	3.80	0.134	0.150
L*	12.00	14.00	0.472	0.551
N	2.34	2.74	0.092	0.108
Q	3.15	3.55	0.124	0.140
ΦP	2.90	3.30	0.114	0.130



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