

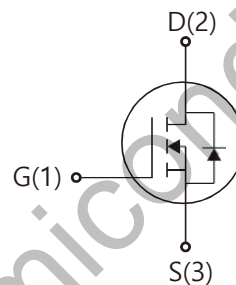
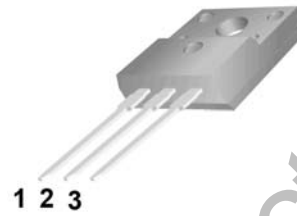


## WGF65R125G

## Features

- Super Junction technology
- Much lower  $R_{on} \cdot A$  Performance for On-state efficiency
- Better efficiency due to very low FOM
- Ultra-fast body diode
- $V_{DSS}=650V$ ,  $I_D=22A$
- $R_{DS(on)} : 95m\Omega$  (Typ) @ $V_G=10V$

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	$I_D$	22	A
$T_C = 25^\circ C$ $T_C = 100^\circ C$		13	
Pulsed drain current ( $T_C = 25^\circ C$ , $t_p$ limited by $T_{jmax}$ )	$I_{D\ pulse}$	88	A
Avalanche energy, single pulse ( $L=30mH$ , $R_g=30\Omega$ )	$E_{AS}$	300	mJ
Gate-Source voltage	$V_{GS}$	$\pm 30$	V
Power dissipation ( $T_C = 25^\circ C$ )	$P_{tot}$	23	W
Operating junction and storage temperature	$T_j, T_{stg}$	-55...+150	$^\circ C$

**Thermal Resistance**

Parameter	Symbol	Value			Unit	Test Condition
		min.	typ.	max.		
Thermal resistance, junction – case. Max	RthJC	-	3.91	5.47	°C/W	
Thermal resistance, junction – ambient. Max	RthJA	-	-	67	°C/W	

**Electrical Characteristic (at T<sub>j</sub> = 25 °C, unless otherwise specified)**

Parameter	Symbol	Value			Unit	Test Condition
		min.	typ.	max.		
<b>Static Characteristic</b>						
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	-	4.6	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> =600V, V <sub>GS</sub> =0V T <sub>C</sub> =25°C T <sub>C</sub> =150°C
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>	-	95	125	mΩ	V <sub>GS</sub> =10V, I <sub>D</sub> =11A, T <sub>C</sub> =25°C T <sub>C</sub> =150°C
Transconductance	g <sub>fs</sub>	-	15	-	S	V <sub>DS</sub> =20V, I <sub>D</sub> =11A
<b>Dynamic Characteristic</b>						
Input Capacitance	C <sub>iss</sub>	-	1587	-	pF	V <sub>GS</sub> =0V, V <sub>DS</sub> =100V, f=1MHz
Output Capacitance	C <sub>oss</sub>	-	95	-		
Reverse Transfer Capacitance	C <sub>rss</sub>	-	39	-		
Gate Total Charge	Q <sub>G</sub>	-	46.23	-	nC	V <sub>GS</sub> =10V, V <sub>DS</sub> =480V, I <sub>D</sub> =11A
Gate-Source charge	Q <sub>gs</sub>	-	13.8	-		
Gate-Drain charge	Q <sub>gd</sub>	-	24.6	-		
Turn-on delay time	t <sub>d(on)</sub>	-	57.2	-	ns	T <sub>j</sub> =25°C, V <sub>GS</sub> =10V, I <sub>D</sub> =11A, V <sub>DS</sub> =400V, R <sub>g</sub> =25Ω
Rise time	t	-	59.2	-		
Turn-off delay time	t <sub>d(off)</sub>	-	150.2	-		
Fall time	t <sub>f</sub>	-	25	-		
Gate resistance	R <sub>gint</sub>	-	10.0	-	Ω	f=1MHz

**Body Diode Characteristic**

Parameter	Symbol	Value			Unit	Test Condition
		min.	typ.	max.		
Body Diode Forward Voltage	$V_{SD}$	0.7	0.86	1.2	V	$V_{GS}=0V, I_{SD}=11A$
Body Diode Reverse Recovery Time	$t_{rr}$	-	116	-	ns	$I_{sd}=11A$ $dI/dt=100A/us$
Body Diode Reverse Recovery Charge	$Q_{rr}$	-	0.6	-	$\mu C$	$V_{ds}=400V$

Typical Performance Characteristics

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

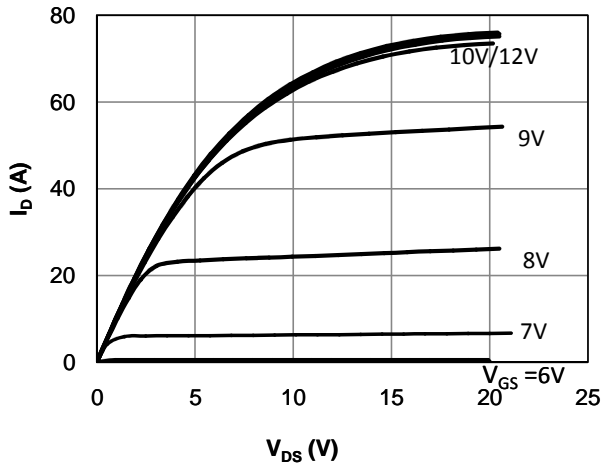


Fig 2. Output Characteristics (Tj=150°C)

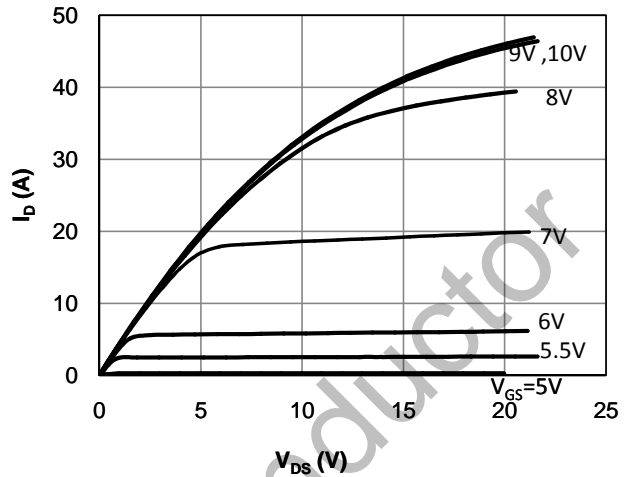


Fig 3: Transfer Characteristics

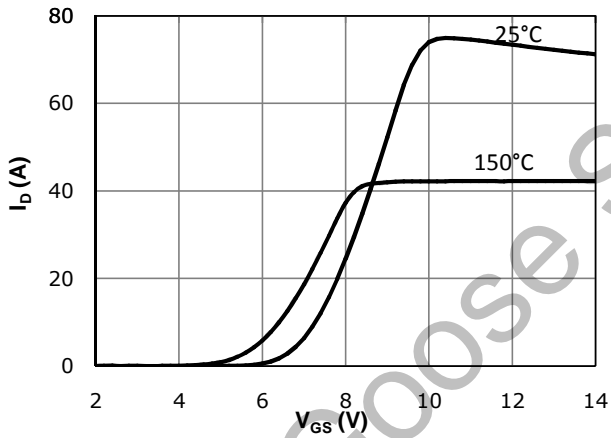


Fig 4:  $V_{TH}$  Vs Tj Temperature Characteristics

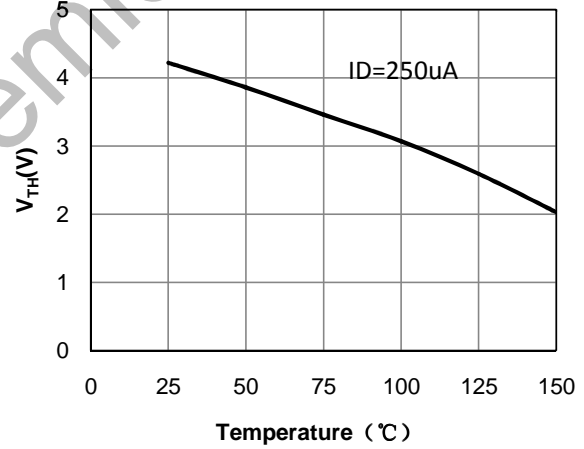


Fig 5:  $R_{DS(on)}$  Vs  $I_{DS}$  Characteristics (Tc=25°C)

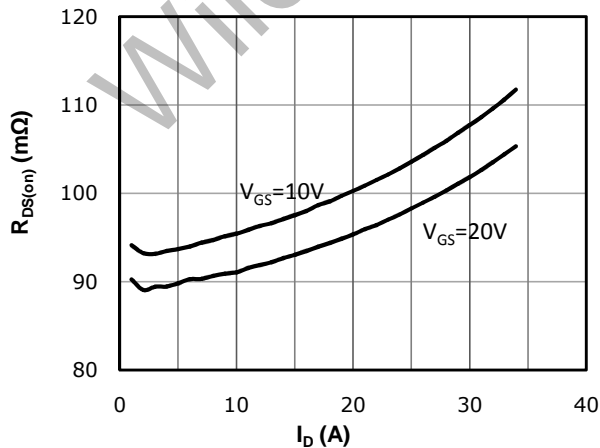


Fig 6:  $R_{DS(on)}$  vs. Temperature

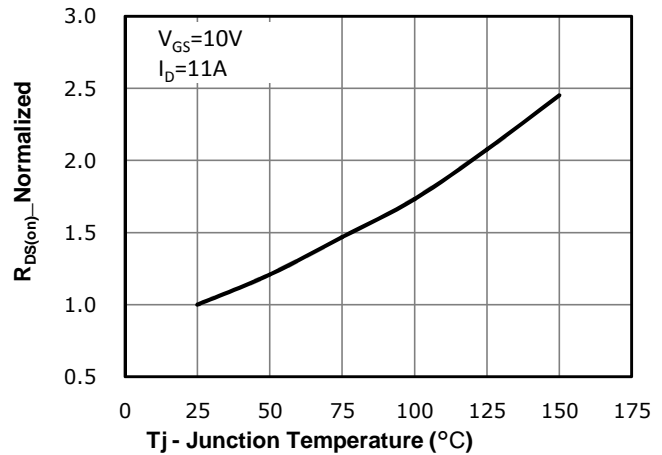


Fig 7: BVDSS vs. Temperature

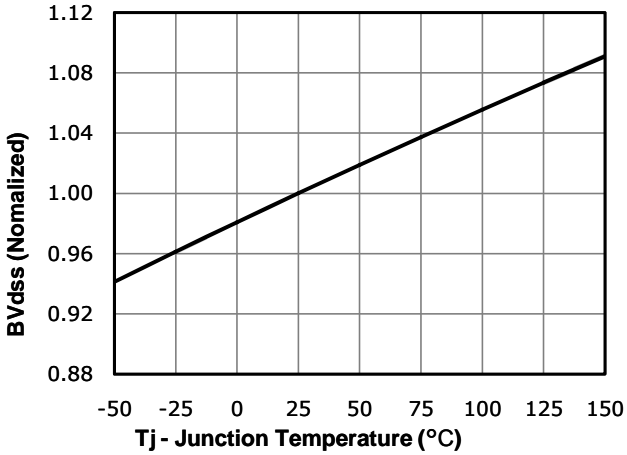


Fig 8: Rds(on) vs Gate Voltage

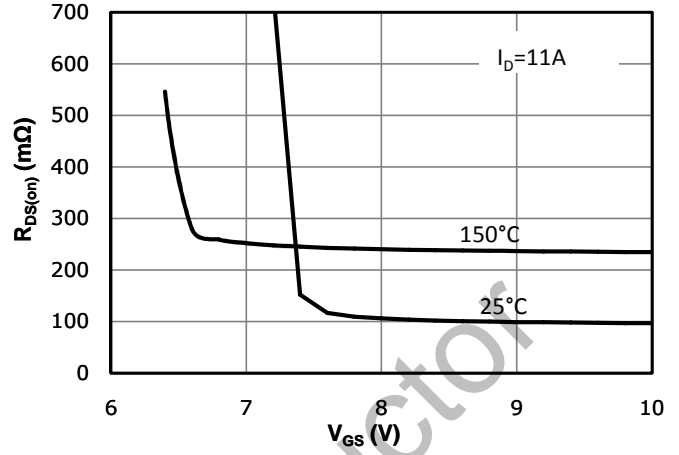


Fig 9: Body-diode Forward Characteristics

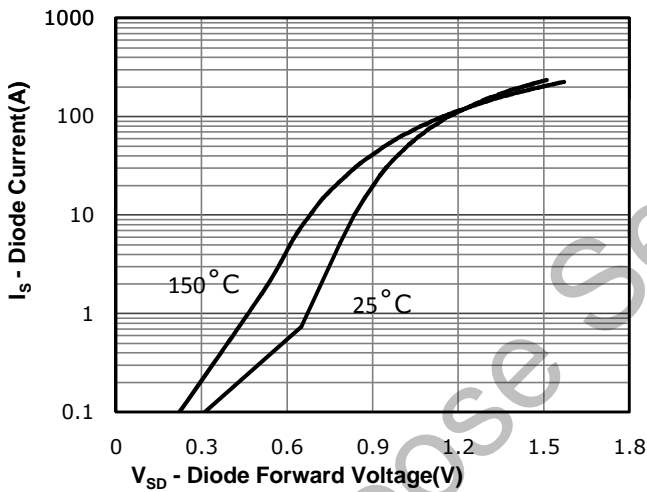


Fig 10: Gate Charge Characteristics

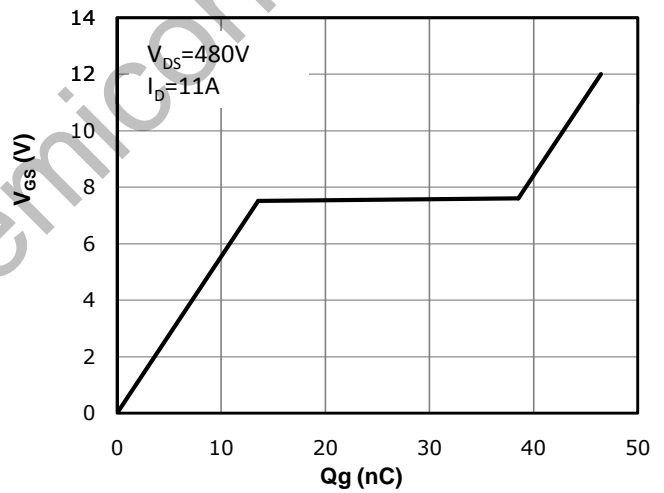


Fig 11: Capacitance Characteristics

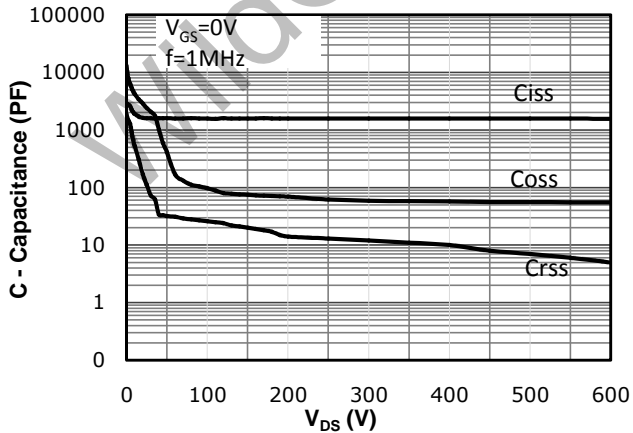


Fig 12: Safe Operating Area

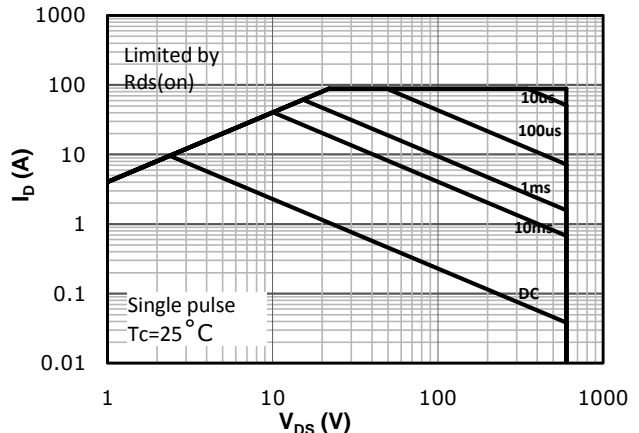
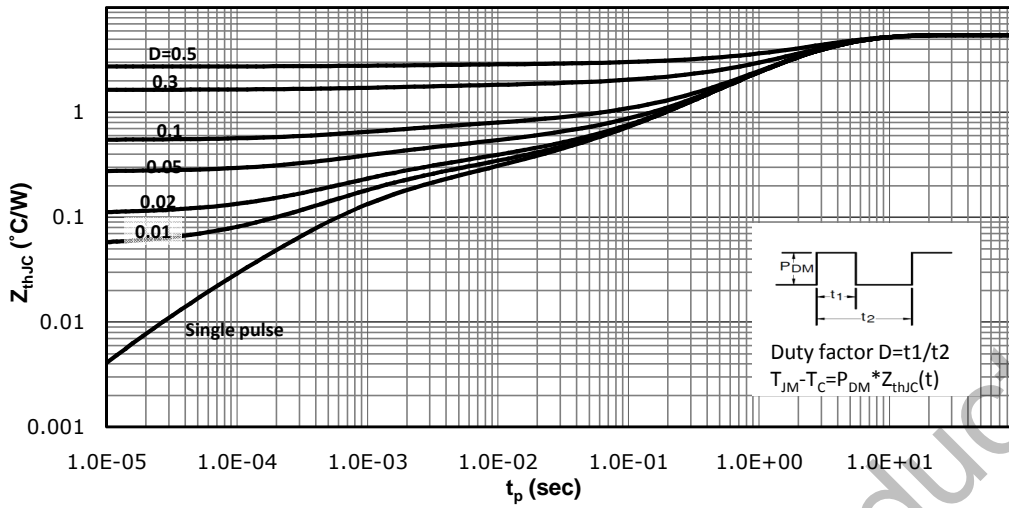
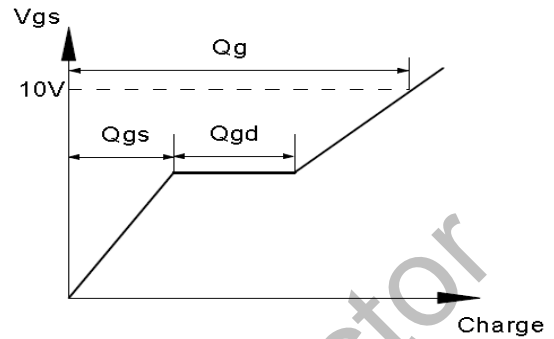
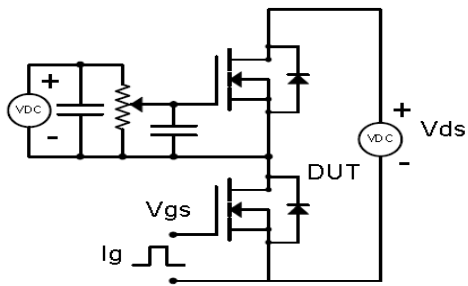


Fig 13: Max. Transient Thermal Impedance

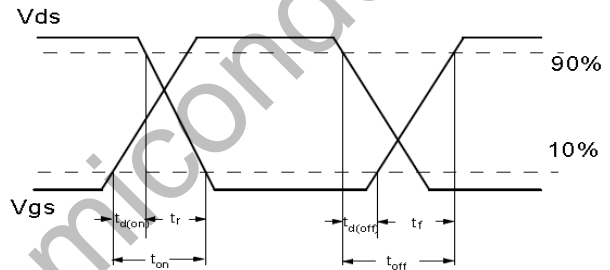
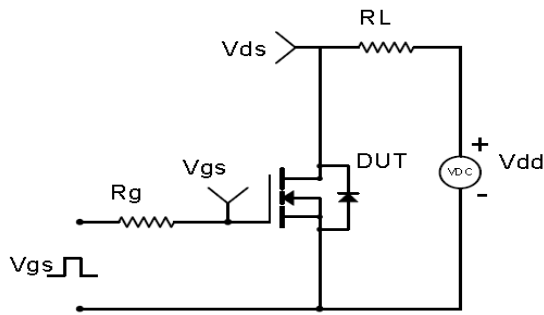


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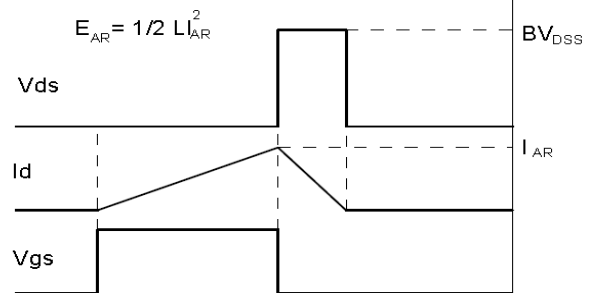
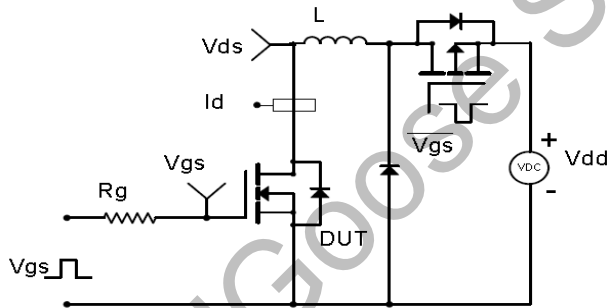
Gate Charge Test Circuit & Waveform



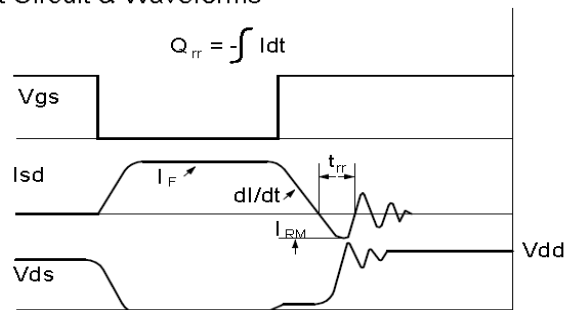
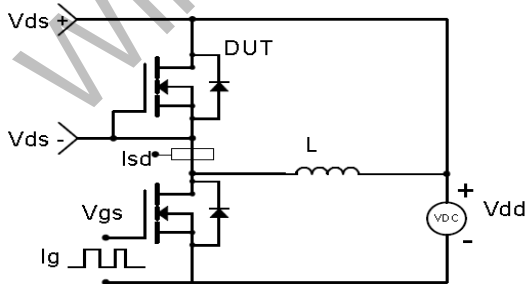
Resistive Switching Test Circuit & Waveforms



Unclamped Inductive Switching (UIS) Test Circuit & Waveforms



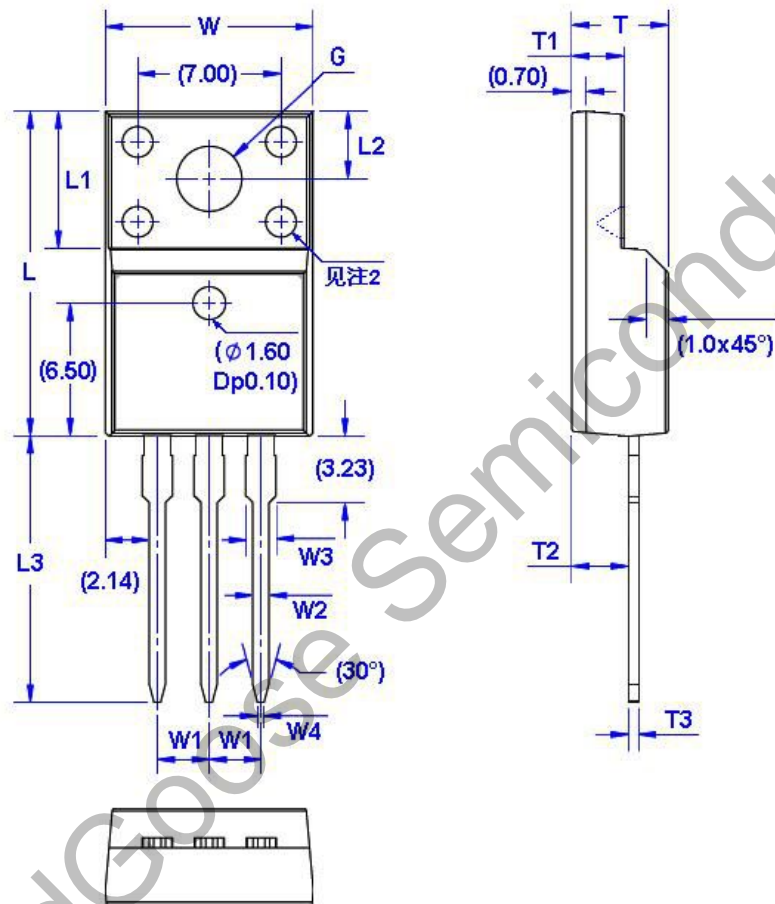
Diode Recovery Test Circuit & Waveforms



Package Dimension

TO-220F

Unit: mm



Symbol	Size		Symbol	Size		Symbol	Size		Symbol	Size	
	Min	Max		Min	Max		Min	Max		Min	Max
W	9.96	10.36	W4	0.25	0.45	L3	12.78	13.18	T3	0.45	0.60
W1	2.54 (TYP)		L	15.67	16.07	T	4.50	4.90	G( $\Phi$ )	3.08	3.28
W2	0.70	0.90	L1	6.48	6.88	T1	2.34	2.74			
W3	1.24	1.47	L2	3.20	3.40	T2	2.56	2.96			



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