

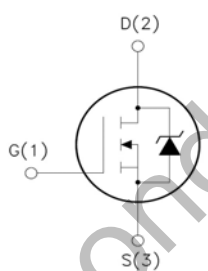
 <p style="font-size: 1.2em; font-weight: bold; margin-top: 10px;">WGP12N60S</p> <p><b>Features:</b></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Low Intrinsic Capacitances</li> <li><input type="checkbox"/> Excellent Switching Characteristics</li> <li><input type="checkbox"/> Extended Safe Operating Area</li> <li><input type="checkbox"/> Unrivalled Gate Charge :Qg= 42nC (Typ.)</li> <li><input type="checkbox"/> BVDSS=600V, ID=12A</li> <li><input type="checkbox"/> R<sub>DS(on)</sub> :0.60 Ω (Max) @VG=10V</li> <li><input type="checkbox"/> 100% Avalanche Tested</li> </ul>	<p style="text-align: center; font-weight: bold;">TO-220</p>  <div style="text-align: center; margin-top: 20px;">  </div> <div style="display: flex; align-items: center; justify-content: center; margin-top: 10px;">  <div style="margin-left: 10px;"> <p>1.Gate (G)</p> <p>2.Drain (D)</p> <p>3.Source (S)</p> </div> </div>
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**Absolute Maximum Ratings** (Ta=25°C unless otherwise noted)

Symbol	Parameter	Value	Unit
V <sub>DSS</sub>	Drain-Source Voltage	600	V
I <sub>D</sub>	Drain Current	T <sub>j</sub> =25°C	12
		T <sub>j</sub> =100°C	7.9
V <sub>GS(TH)</sub>	Gate Threshold Voltage	±30	V
E <sub>AS</sub>	Single Pulse Avalanche Energy (note1)	870	mJ
I <sub>AR</sub>	Avalanche Current (note2)	12	A
P <sub>D</sub>	Power Dissipation (T <sub>j</sub> =25°C)	140	W
T <sub>j</sub>	Junction Temperature(Max)	150	°C
T <sub>stg</sub>	Storage Temperature	-55~+150	°C
TL	Maximum lead temperature for soldering purpose, 1/8" from case for 5 seconds	300	°C

**Thermal Characteristics**

Symbol	Parameter	Typ.	Max.	Unit
R <sub>θJC</sub>	Thermal Resistance, Junction to Case	-	0.89	°C/W
R <sub>θJA</sub>	Thermal Resistance, Junction to Ambient	-	62.5	°C/W

## Electrical Characteristics (Ta=25°C unless otherwise noted)

Symbol	Parameter	Test Condition	Min.	Typ.	Max.	Unit
<b>Off Characteristics</b>						
BV <sub>DSS</sub>	Drain-Source Breakdown Voltage	I <sub>D</sub> =250μA, V <sub>GS</sub> =0	600	-	-	V
ΔBV <sub>DSS</sub> /ΔT <sub>J</sub>	Breakdown Voltage Temperature Coefficient	I <sub>D</sub> =250μA, Reference to 25°C	-	0.71	-	V/°C
I <sub>DSS</sub>	Zero Gate Voltage Drain Current	V <sub>DS</sub> =600V, V <sub>GS</sub> =0V	-	-	10	μA
		V <sub>DS</sub> =480V, T <sub>J</sub> =125°C	-	-	100	
I <sub>GSSF</sub>	Gate-body leakage Current, Forward	V <sub>GS</sub> =+30V, V <sub>DS</sub> =0V	-	-	100	nA
I <sub>GSSR</sub>	Gate-body leakage Current, Reverse	V <sub>GS</sub> =-30V, V <sub>DS</sub> =0V	-	-	-100	
<b>On Characteristics</b>						
V <sub>GS(TH)</sub>	Gate Threshold Voltage	I <sub>D</sub> =250μA, V <sub>DS</sub> =V <sub>GS</sub>	2	-	4	V
R <sub>DS(ON)</sub>	Static Drain-Source On-Resistance	I <sub>D</sub> =6.0A, V <sub>GS</sub> =10V	-	-	0.60	Ω
<b>Dynamic Characteristics</b>						
C <sub>iss</sub>	Input Capacitance	V <sub>DS</sub> =25V, V <sub>GS</sub> =0, f=1.0MHz	-	1920	-	pF
C <sub>oss</sub>	Output Capacitance		-	166	-	
C <sub>rss</sub>	Reverse Transfer Capacitance		-	18	-	
<b>Switching Characteristics</b>						
T <sub>d(on)</sub>	Turn-On Delay Time	V <sub>DD</sub> =300V, I <sub>D</sub> =12A R <sub>G</sub> =25Ω (Note 3,4)	-	30	70	ns
T <sub>r</sub>	Turn-On Rise Time		-	80	165	
T <sub>d(off)</sub>	Turn-Off Delay Time		-	144	300	
T <sub>f</sub>	Turn-Off Rise Time		-	77	165	
Q <sub>g</sub>	Total Gate Charge	V <sub>DS</sub> =480V, V <sub>GS</sub> =10V, I <sub>D</sub> =12A (Note 3,4)	-	44	47	nC
Q <sub>gs</sub>	Gate-Source Charge		-	6.7	-	
Q <sub>gd</sub>	Gate-Drain Charge		-	18.5	-	
<b>Drain-Source Diode Characteristics and Maximum Ratings</b>						
I <sub>S</sub>	Max. Diode Forward Current	-	-	-	12	A
I <sub>SM</sub>	Max. Pulsed Forward Current	-	-	-	48	
V <sub>SD</sub>	Diode Forward Voltage	I <sub>D</sub> =12A	-	-	1.4	V
T <sub>rr</sub>	Reverse Recovery Time	I <sub>S</sub> =12A, V <sub>GS</sub> =0V diF/dt=100A/μs	-	380	-	nS
Q <sub>rr</sub>	Reverse Recovery Charge	(Note3)	-	3.5	-	μC

- Notes : 1, L=17.1mH, I<sub>AS</sub>=12A, V<sub>DD</sub>=50V, R<sub>G</sub>=25Ω, Starting T<sub>J</sub>=25°C  
 2, Repetitive Rating : Pulse width limited by maximum junction temperature  
 3, Pulse Test : Pulse Width ≤ 300μs, Duty Cycle ≤ 2%  
 4, Essentially Independent of Operating Temperature

Typical Characteristics

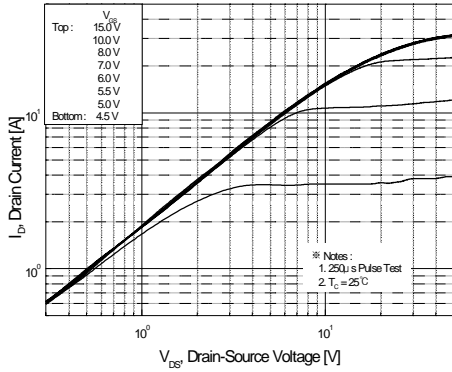


Figure 1. On-Region Characteristics

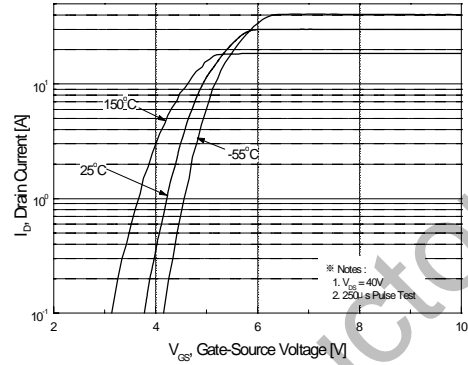


Figure 2. Transfer Characteristics

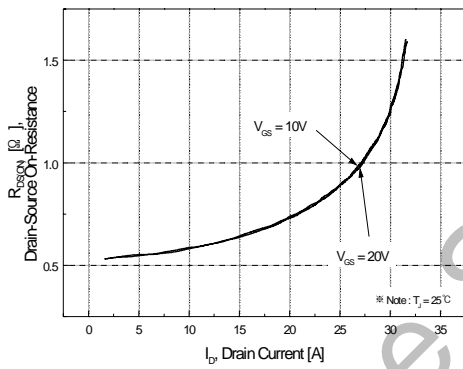


Figure 3. On-Resistance Variation vs Drain Current and Gate Voltage

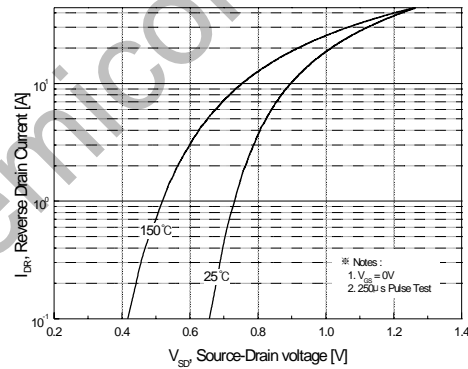


Figure 4. Body Diode Forward Voltage Variation with Source Current and Temperature

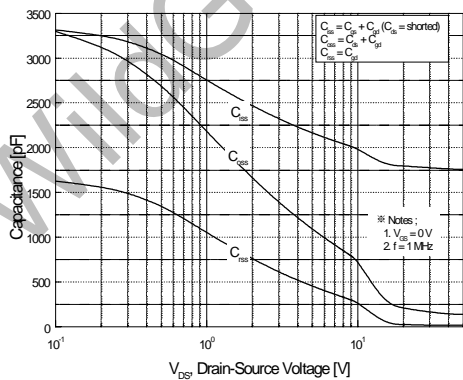


Figure 5. Capacitance Characteristics

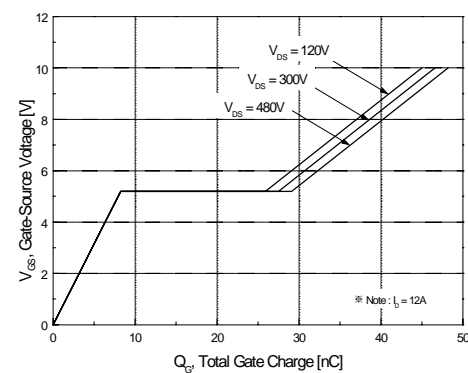


Figure 6. Gate Charge Characteristics

Typical Characteristics (Continued)

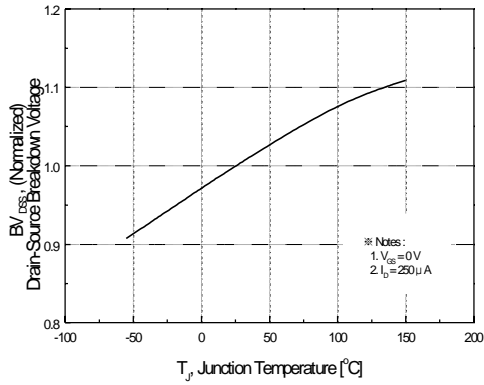


Figure 7. Breakdown Voltage Variation vs Temperature

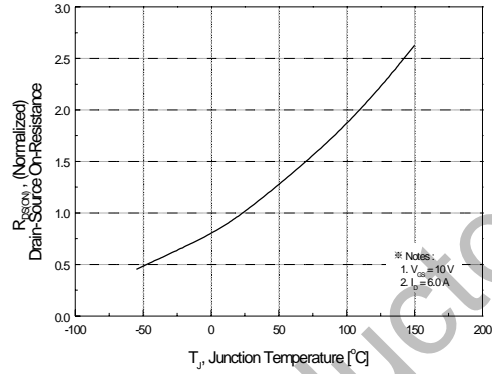


Figure 8. On-Resistance Variation vs Temperature

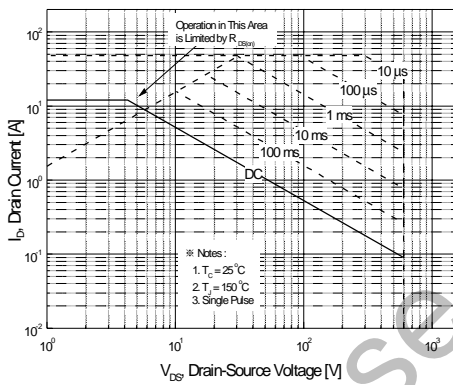


Figure 9-2. Maximum Safe Operating Area

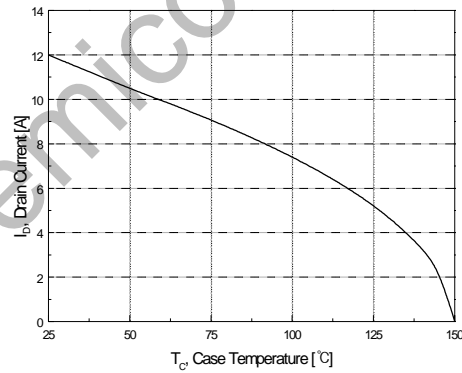


Figure 10. Maximum Drain Current vs Case Temperature

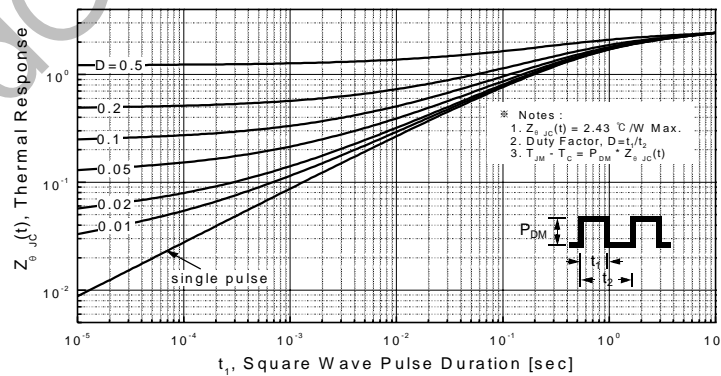
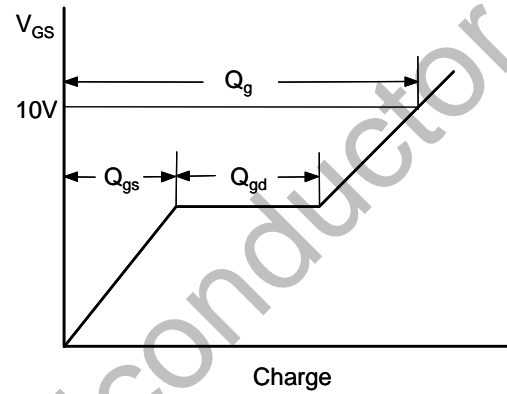
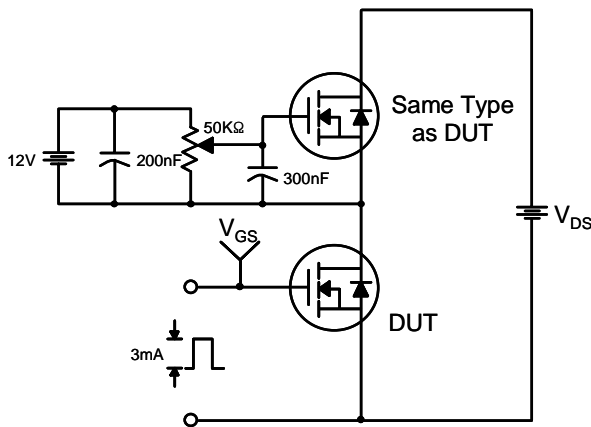
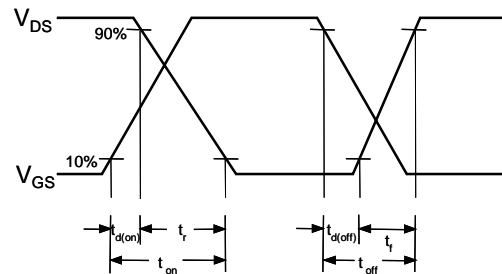
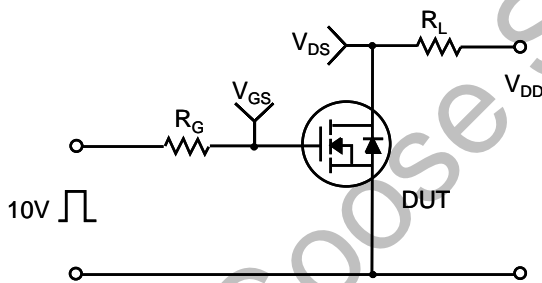


Figure 11-2. Transient Thermal Response Curve

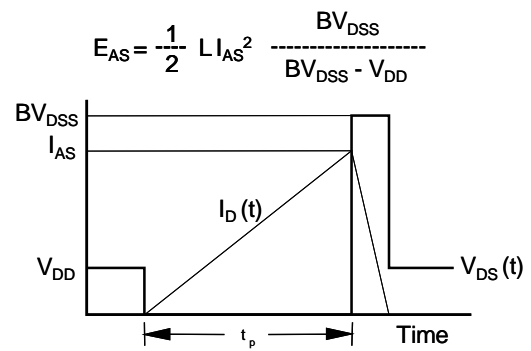
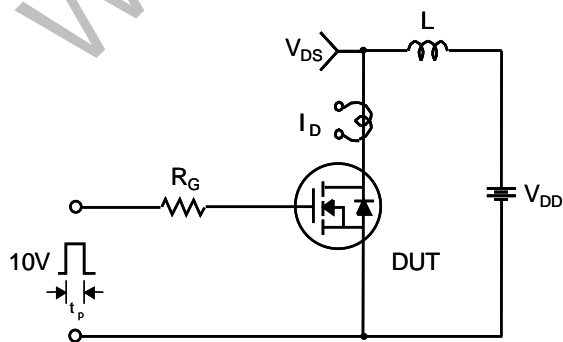
Gate Charge Test Circuit & Waveform



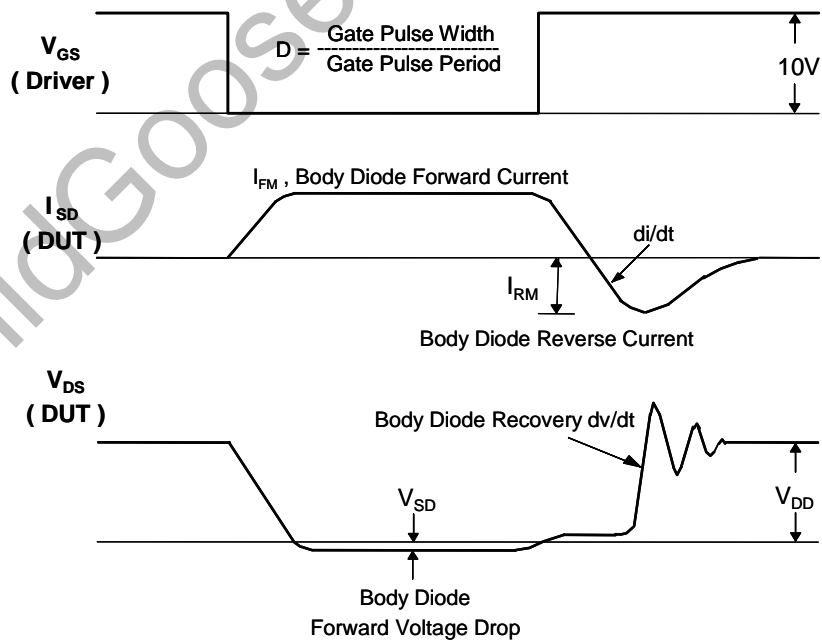
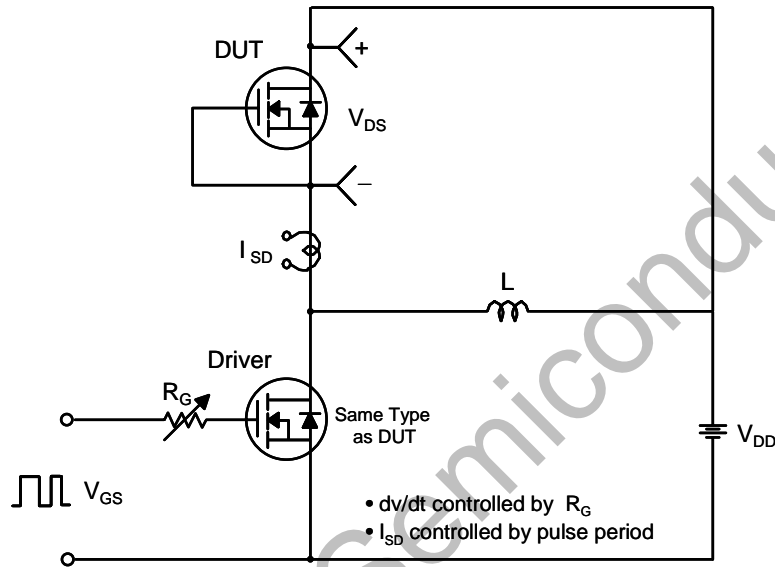
Resistive Switching Test Circuit & Waveforms



Unclamped Inductive Switching Test Circuit & Waveforms



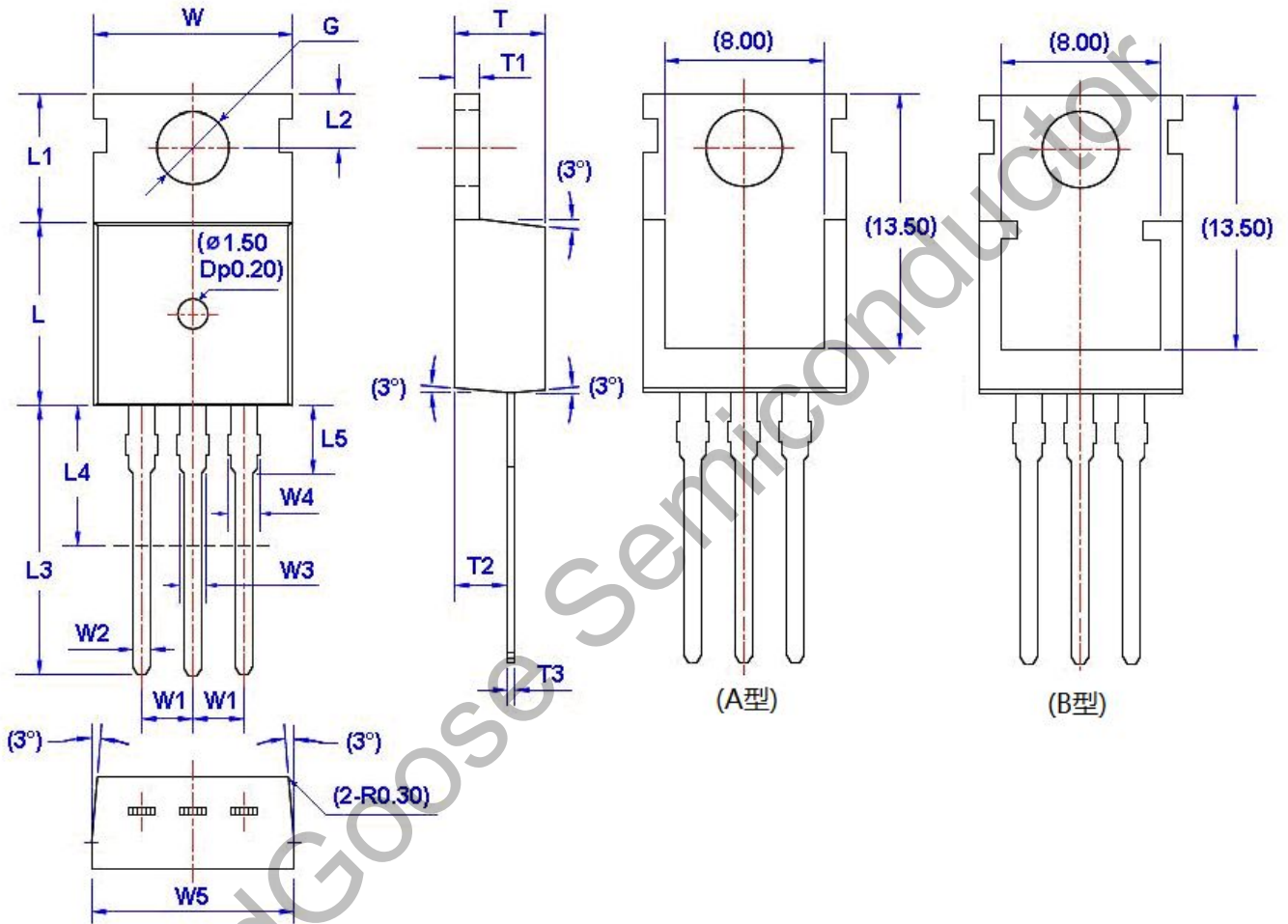
Peak Diode Recovery dv/dt Test Circuit & Waveforms



Package Dimension

TO-220

Unit: mm



符号	尺寸		符号	尺寸		符号	尺寸		符号	尺寸	
	Min	Max		Min	Max		Min	Max		Min	Max
W	9.66	10.28	W5	9.80	10.20	L4**	6.20	6.60	T3	0.45	0.60
W1	2.54 (TYP)		L	9.00	9.40	L5	2.79	3.30	G(Φ)	3.50	3.70
W2	0.70	0.95	L1	6.40	6.80	T	4.30	4.70			
W3	1.17	1.37	L2	2.70	2.90	T1	1.15	1.40			
W4*	1.32	1.72	L3	12.70	14.27	T2	2.20	2.60			

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