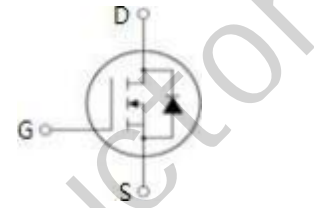
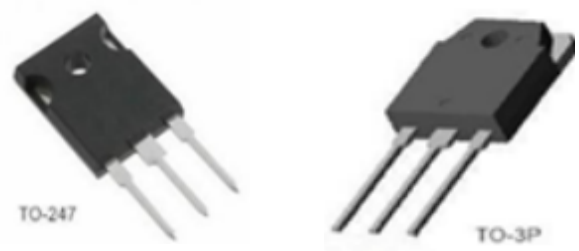


## FEATURES

- Fast switching
- 100% avalanche tested
- Improved dv/dt capability

## APPLICATIONS

- Switch Mode Power Supply (SMPS)
- Uninterruptible Power Supply (UPS)
- Power Factor Correction (PFC)



Device Marking and Package Information		
Device	Package	Marking
JSM90N20P	TO-3P	JSM90N20P
JSM90N20P	TO-247	JSM90N20P

Absolute Maximum Ratings $T_C = 25^\circ\text{C}$ , unless otherwise noted				
Parameter	Symbol	Value		Unit
		TO-3P	TO-247	
Drain-Source Voltage ( $V_{GS} = 0\text{V}$ )	$V_{DSS}$	220		V
Continuous Drain Current $V_{GS} = 10\text{V}$ $T_C = 25^\circ\text{C}$	$I_b$	80		A
Pulsed Drain Current (note1)	$I_{DM}$	320		A
Gate-Source Voltage	$V_{GSS}$	$\pm 20$		V
Single Pulse Avalanche Energy (note2)	$E_{AS}$	1960.2		mJ
Avalanche Current (note1)	$I_{AS}$	19.8		A
Repetitive Avalanche Energy (note1)	$E_{AR}$	1176.1		mJ
Power Dissipation ( $T_C = 25^\circ\text{C}$ )	$P_D$	140		W
Peak Diode Recovery dv/dt (note1)	dv/dt	5.0		
Operating Junction and Storage Temperature Range	$T_J, T_{stg}$	-55~+150		$^\circ\text{C}$

Thermal Resistance			
Parameter	Symbol	Value	Unit
Thermal Resistance, Junction-to-Case	$R_{thJC}$	0.89	$^\circ\text{C/W}$
Thermal Resistance, Junction-to-Ambient	$R_{thJA}$	60	

Specifications $T_J = 25^\circ\text{C}$ , unless otherwise noted						
Parameter	Symbol	Test Conditions	Value			Unit
			Min.	Typ.	Max.	
<b>Static</b>						
Drain-Source Breakdown Voltage	$V_{(BR)DSS}$	$V_{GS} = 0V, I_D = 250\mu A$	220	--	--	V
Zero Gate Voltage Drain Current	$I_{DSS}$	$V_{DS} = 40V, V_{GS} = 0V, T_J = 25^\circ\text{C}$	--	--	1	$\mu A$
		$V_{DS} = 32V, V_{GS} = 0V, T_J = 125^\circ\text{C}$	--	--	100	
Gate-Source Leakage	$I_{GSS}$	$V_{GS} = \pm 20V$	--	--	$\pm 100$	nA
Gate-Source Threshold Voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}, I_D = 250\mu A$	2.0	--	4.0	V
Drain-Source On-Resistance (Note3)	$R_{DS(on)}$	$V_{GS} = 10V, I_D = 95A(\text{Note4})$	--	30	35	$m\Omega$
<b>Dynamic</b>						
Input Capacitance	$C_{iss}$	$V_{GS} = 0V, V_{DS} = 25V, f = 1.0MHz$	--	5784	--	$pF$
Output Capacitance	$C_{oss}$		--	893	--	
Reverse Transfer Capacitance	$C_{rss}$		--	561	--	
Total Gate Charge	$Q_g$	$V_{DD} 20V, I_D = 190A, V_{GS} = 10V(\text{Note4})$	--	367	--	nC
Gate-Source Charge	$Q_{gs}$		--	33.8	--	
Gate-Drain Charge	$Q_{gd}$		--	177	--	
Turn-on Delay Time	$t_{d(on)}$	$V_{DD} = 20V, I_D = 190A, R_G = 10\Omega, V_{GS} = 10V(\text{Note4})$	--	55	--	ns
Turn-on Rise Time	$t_r$		--	165	--	
Turn-off Delay Time	$t_{d(off)}$		--	1050	--	
Turn-off Fall Time	$t_f$		--	367	--	
<b>Drain-Source Body Diode Characteristics</b>						
Continuous Body Diode Current	$I_S$	$T_C = 25^\circ\text{C}$	--	--	80	A
Pulsed Diode Forward Current	$I_{SM}$		--	--	320	
Body Diode Voltage	$V_{SD}$	$T_J = 25^\circ\text{C}, I_{SD} = 95A, V_{GS} = 0V$	--	--	1.4	V
Reverse Recovery Time	$t_{rr}$	$V_{GS} = 0V, I_S = 190A, di_f/dt = 100A/\mu s$	--	360	--	ns
Reverse Recovery Charge	$Q_{rr}$		--	5.61	--	$\mu C$

**Notes**

1. Repetitive Rating: Pulse width limited by maximum junction temperature
2.  $L = 10mH, V_{DD} = 50V, R_G = 25\Omega, \text{Starting } T_J = 25^\circ\text{C}$
3. Pulse Test: Pulse width  $\leq 300\mu s, \text{Duty Cycle} \leq 1\%$

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

Figure 1. Output Characteristics ( $T_J = 25^\circ\text{C}$ )

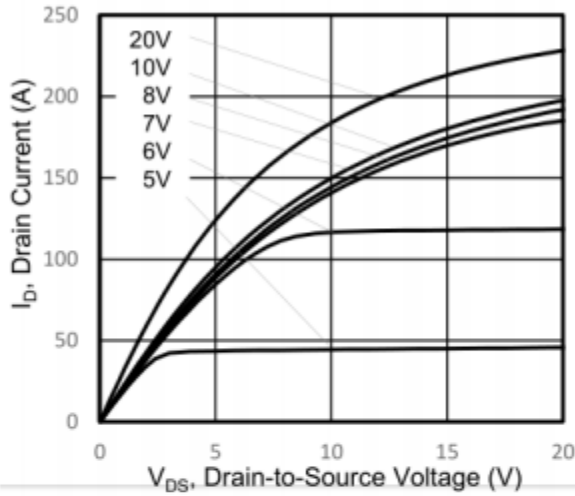


Figure 2. Body Diode Forward Voltage

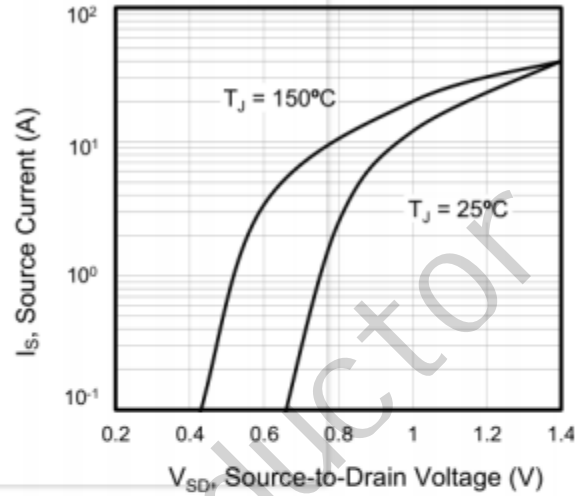


Figure 3. Drain Current vs. Temperature

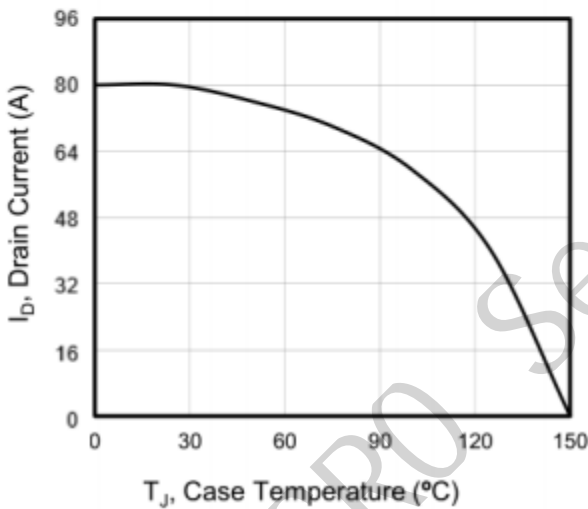


Figure 4.  $BV_{DSS}$  Variation vs. Temperature

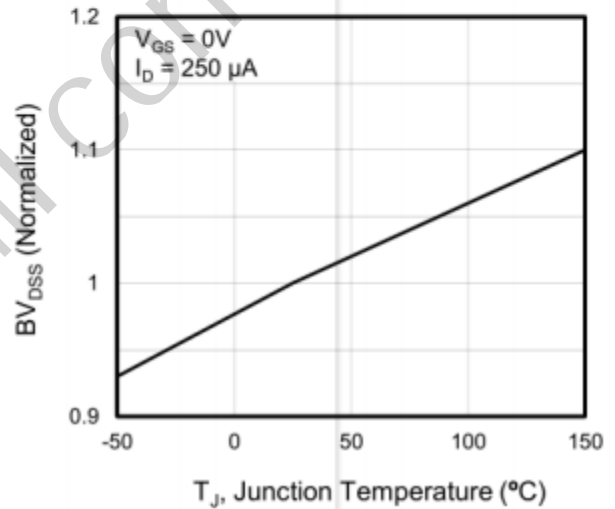


Figure 5. Transfer Characteristics

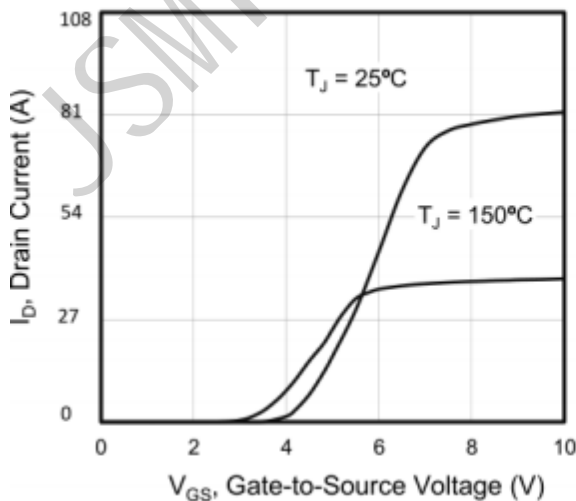
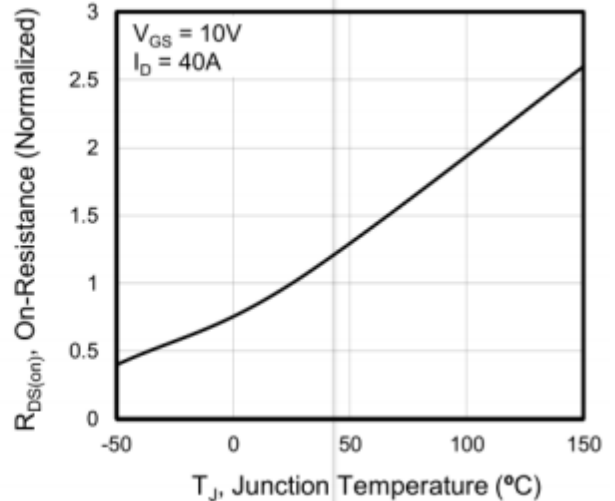


Figure 6. On-Resistance vs. Temperature



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

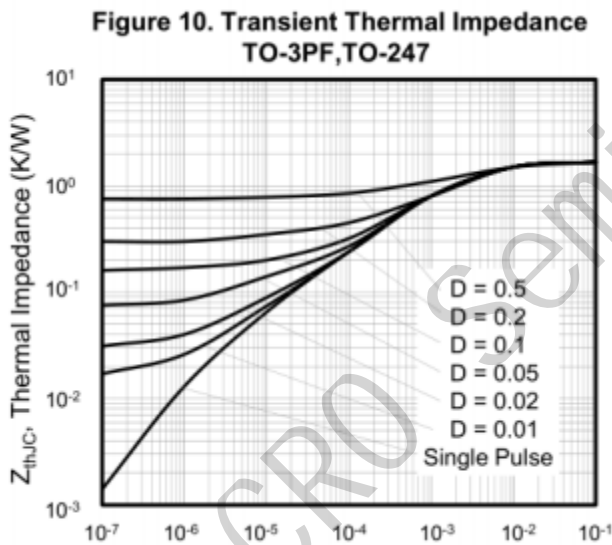
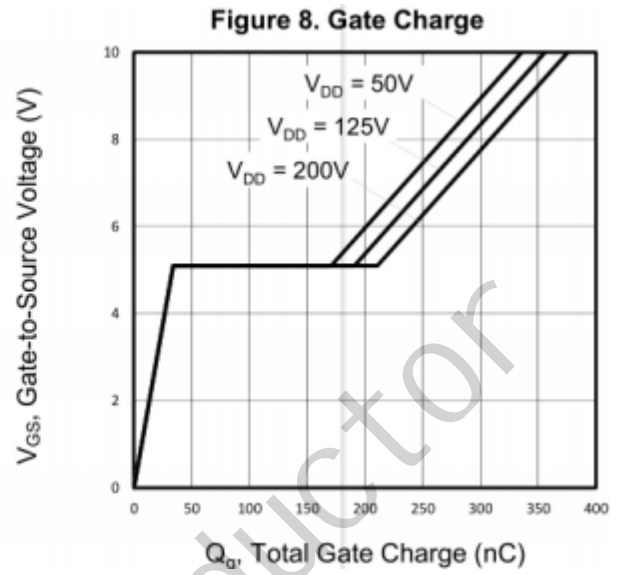
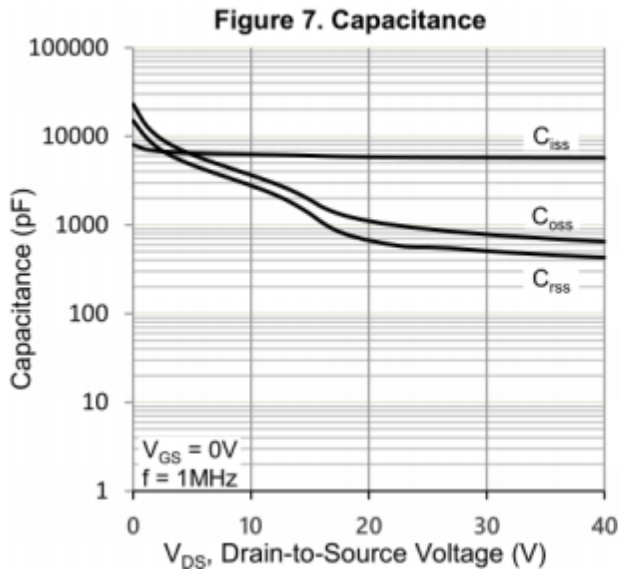


Figure A: Gate Charge Test Circuit and Waveform

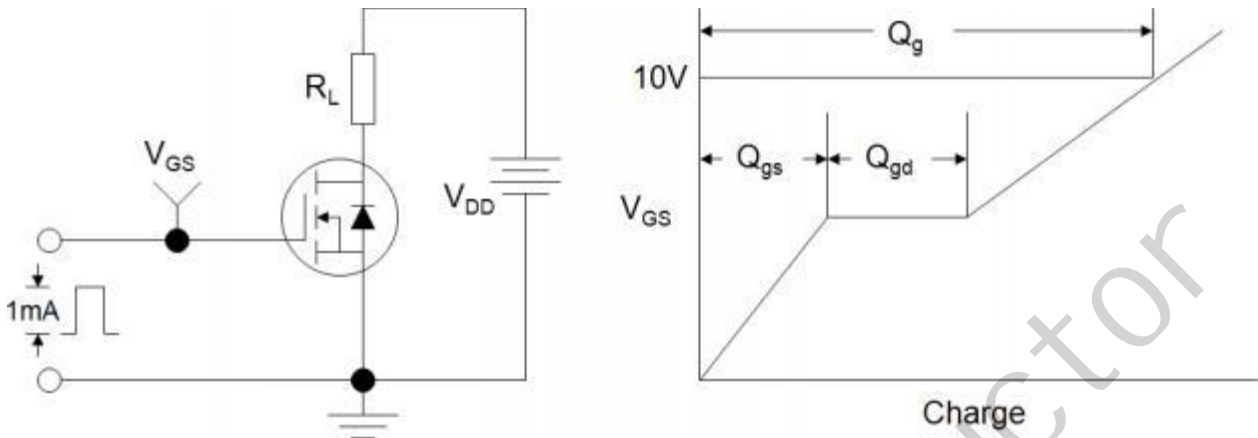


Figure B : Resistive Switching Test Circuit and Waveform

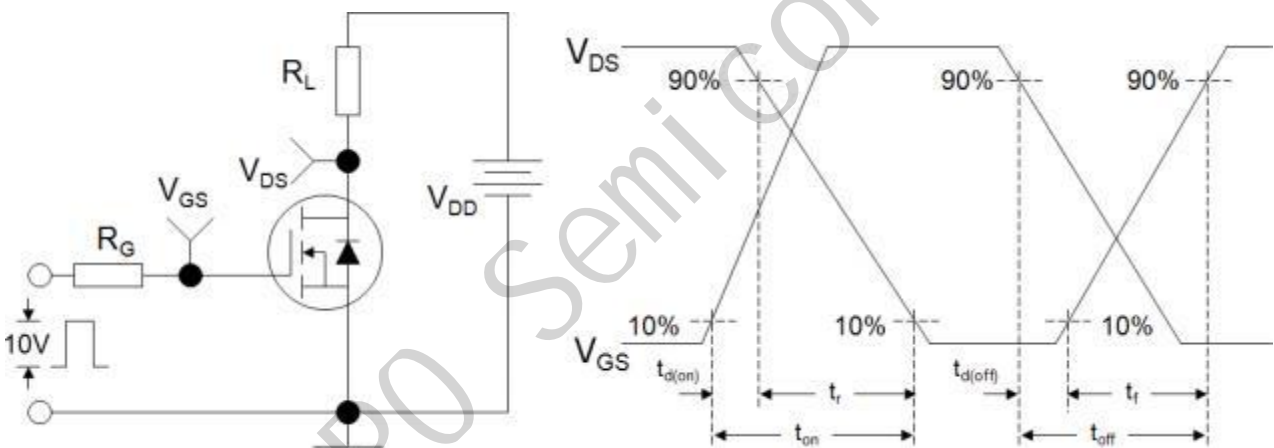
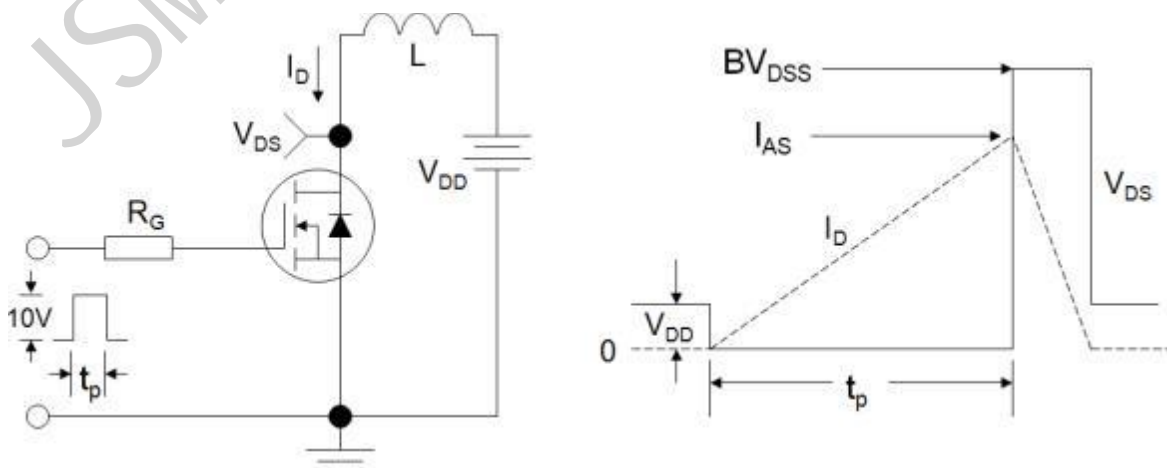


Figure C : Unclamped Inductive Switching Test Circuit and Waveform



TO-247 Package Dimensions

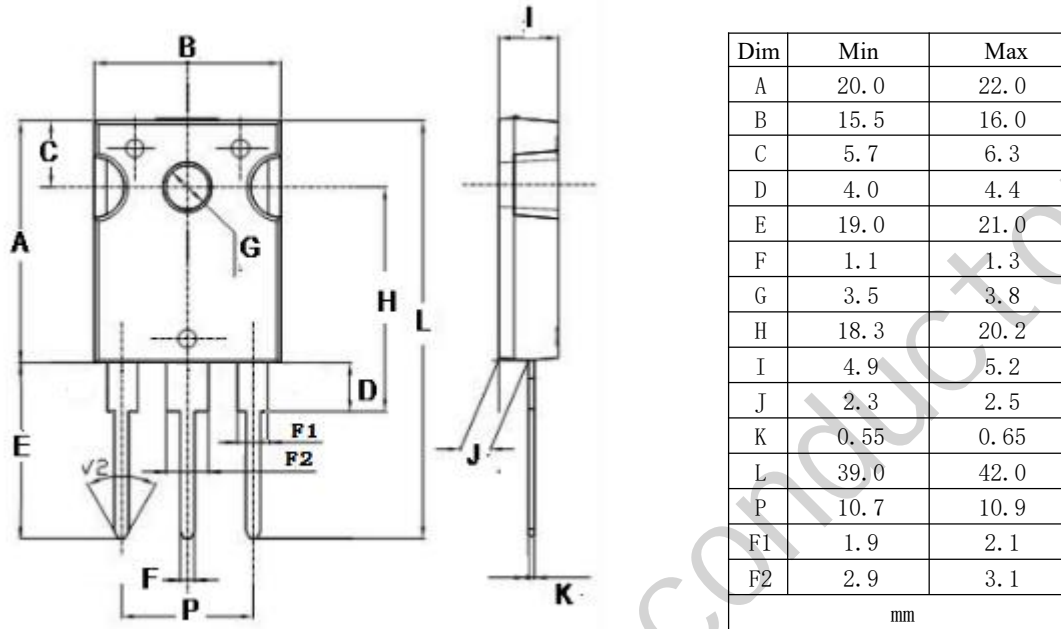
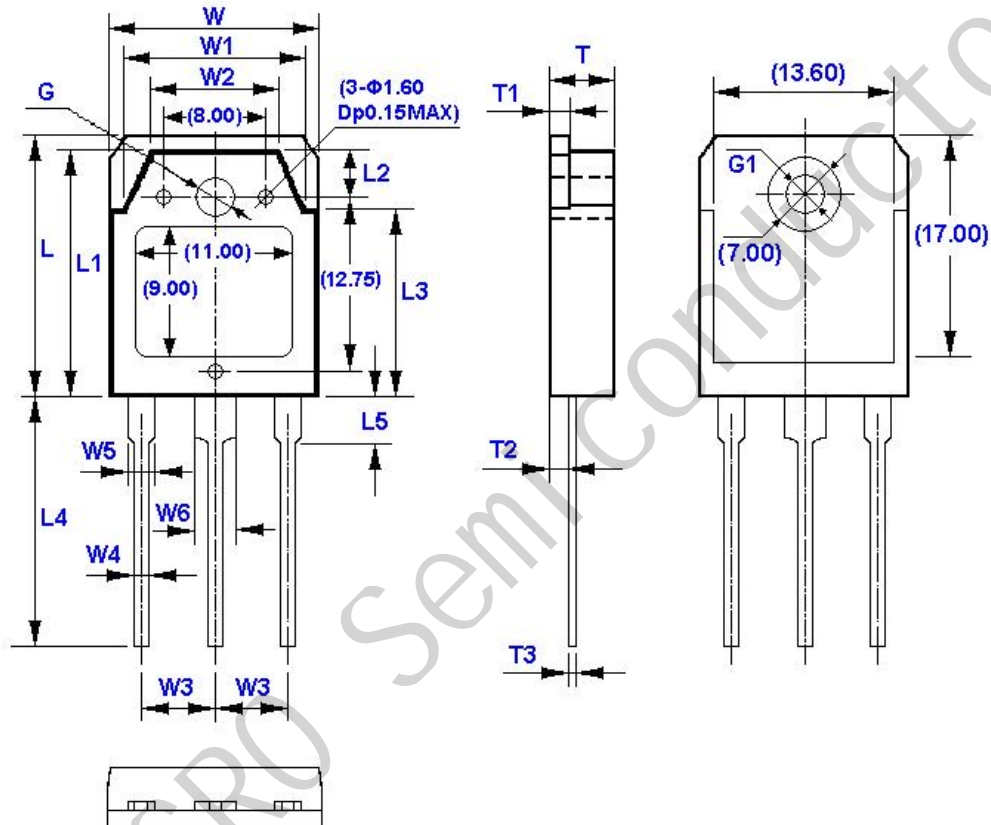


Fig.2 outline dimensions (unindicated tolerance:±0.1mm)

## TO-3P

Unit: mm



Symbol	Size		Symbol	Size		Symbol	Size		Symbol	Size	
	Min	Max		Min	Max		Min	Max		Min	Max
W	15.40	15.80	W5	1.80	2.20	L3	13.70	14.10	T2	1.20	1.60
W1	13.40	13.80	W6	2.80	3.20	L4	19.70	20.30	T3	0.55	0.75
W2	9.40	9.80	L	19.70	20.10	L5	3.30	3.70	G ( $\Phi$ ) (Front)	3.30	3.50
W3	5.45 (TYP)		L1	18.50	18.90	T	4.60	5.00	G1( $\Phi$ ) (Back)	3.10	3.30
W4	0.80	1.20	L2	3.60	4.00	T1	1.45	1.65			

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