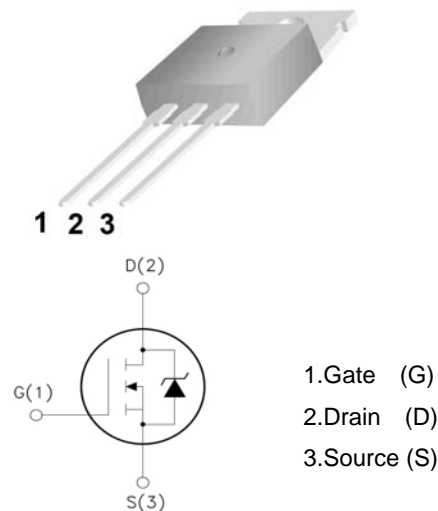




## Features:

- Low Intrinsic Capacitances.
- Excellent Switching Characteristics.
- Extended Safe Operating Area.
- Unrivalled Gate Charge : $Q_g = 31\text{nC}$  (Typ.).
- $BV_{DSS} = 100\text{V}, I_D = 30\text{A}$
- $R_{DS(on)} : 0.07\Omega$  (Max) @  $V_G = 10\text{V}$
- 100% Avalanche Tested

TO-220



## Absolute Maximum Ratings\* ( $T_c = 25^\circ\text{C}$ Unless otherwise noted)

Parameter	Symbol	Limit	Unit
Drain-Source Voltage	$V_{DS}$	100	V
Gate-Source Voltage	$V_{GS}$	$\pm 20$	V
Drain Current-Continuous	$I_D$	30	A
Drain Current-Continuous( $T_c = 100^\circ\text{C}$ )	$I_D(100^\circ\text{C})$	12	A
Pulsed Drain Current	$I_{DM}$	60	A
Maximum Power Dissipation	$P_D$	55	W
Single pulse avalanche energy <sup>(Note 5)</sup>	$E_{AS}$	250	mJ
Operating Junction and Storage Temperature Range	$T_J, T_{STG}$	-55 To 150	$^\circ\text{C}$

## Thermal Characteristics

Thermal Resistance, Junction-to-Case(Note 2)	$R_{\theta JC}$	2.27	$^\circ\text{C/W}$
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# HCS30N10 100V N-Channel MOSFET

## Electrical Characteristics ( $T_C=25^\circ\text{C}$ unless otherwise noted)

Parameter	Symbol	Condition	Min	Typ	Max	Unit
<b>Off Characteristics</b>						
Drain-Source Breakdown Voltage	$BV_{DSS}$	$V_{GS}=0V, I_D=250\mu A$	100	110	-	V
Zero Gate Voltage Drain Current	$I_{DSS}$	$V_{DS}=100V, V_{GS}=0V$	-	-	1	$\mu A$
Gate-Body Leakage Current	$I_{GSS}$	$V_{GS}=\pm 20V, V_{DS}=0V$	-	-	$\pm 100$	nA
<b>On Characteristics</b> (Note 3)						
Gate Threshold Voltage	$V_{GS(th)}$	$V_{DS}=V_{GS}, I_D=250\mu A$	1.2	1.8	2.5	V
Drain-Source On-State Resistance	$R_{DS(ON)}$	$V_{GS}=10V, I_D=5A$	-	56	70	m $\Omega$
Forward Transconductance	$g_{FS}$	$V_{DS}=50V, I_D=9A$	12	-	-	S
<b>Dynamic Characteristics</b> (Note 4)						
Input Capacitance	$C_{iss}$	$V_{DS}=25V, V_{GS}=0V,$ $F=1.0\text{MHz}$	-	1350	-	PF
Output Capacitance	$C_{oss}$		-	240	-	PF
Reverse Transfer Capacitance	$C_{rss}$		-	180	-	PF
<b>Switching Characteristics</b> (Note 4)						
Turn-on Delay Time	$t_{d(on)}$	$V_{DD}=30V, I_D=2A, R_L=15\Omega$ $V_{GS}=10V, R_G=2.5\Omega$	-	13.8	-	nS
Turn-on Rise Time	$t_r$		-	9.3	-	nS
Turn-Off Delay Time	$t_{d(off)}$		-	43.8	-	nS
Turn-Off Fall Time	$t_f$		-	11.4	-	nS
Total Gate Charge	$Q_g$	$V_{DS}=30V, I_D=3A,$ $V_{GS}=10V$	-	31	-	nC
Gate-Source Charge	$Q_{gs}$		-	6.4	-	nC
Gate-Drain Charge	$Q_{gd}$		-	9.4	-	nC
<b>Drain-Source Diode Characteristics</b>						
Diode Forward Voltage	$V_{SD}$	$V_{GS}=0V, I_S=9A$	-	-	1.2	V
Diode Forward Current	$I_S$		-	-	30	A
Forward Turn-On Time	$t_{on}$	Intrinsic turn-on time is negligible (turn-on is dominated by LS+LD)				

### Notes:

1. Repetitive Rating: Pulse width limited by maximum junction temperature.
2. Surface Mounted on FR4 Board,  $t \leq 10$  sec.
3. Pulse Test: Pulse Width  $\leq 300\mu s$ , Duty Cycle  $\leq 2\%$ .
4. Guaranteed by design, not subject to production
5. EAS condition :  $T_j=25^\circ\text{C}, V_{DD}=50V, V_G=10V, L=0.5\text{mH}, R_g=25\Omega$



Typical Electrical and Thermal Characteristics (Curves)

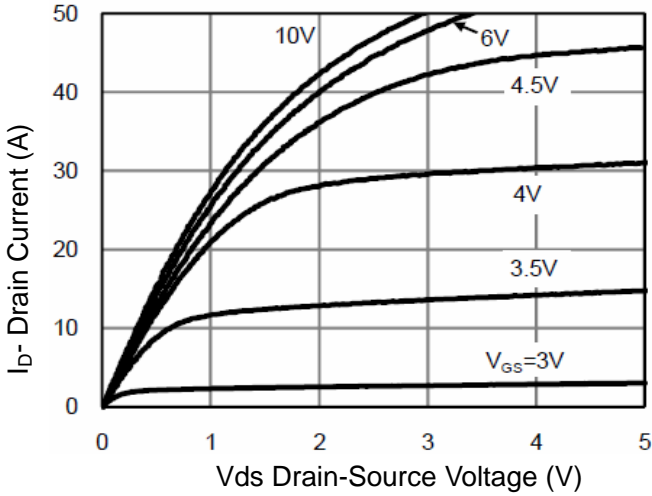


Figure 1 Output Characteristics

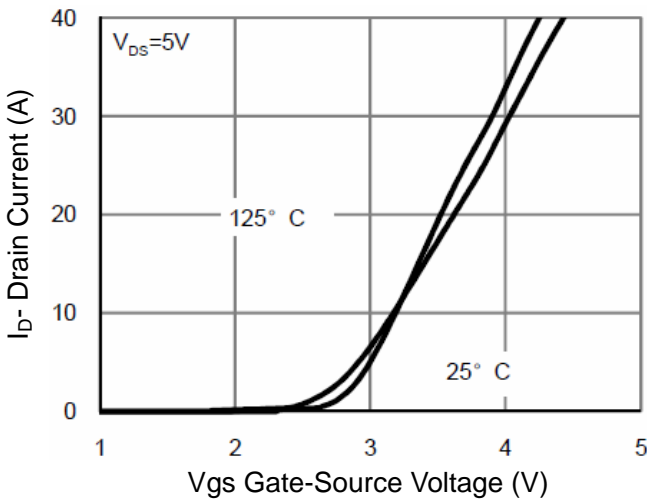


Figure 2 Transfer Characteristics

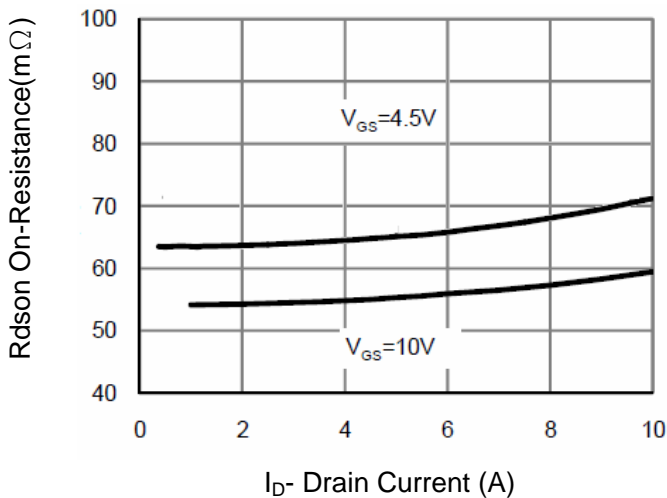


Figure 3 Rds(on)- Drain Current

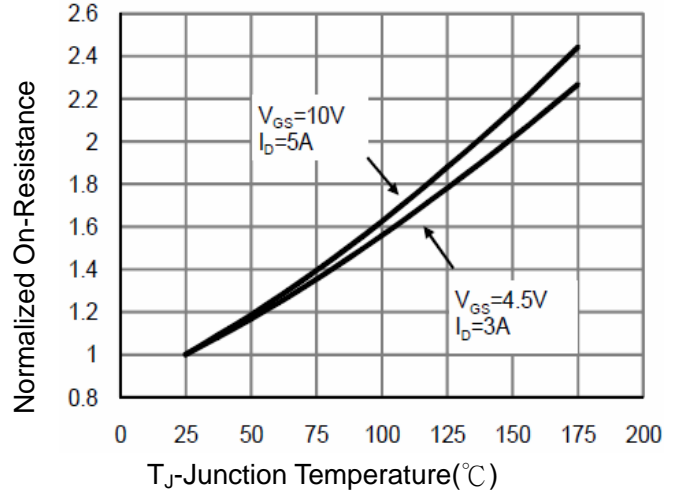


Figure 4 Rds(on)-Junction Temperature

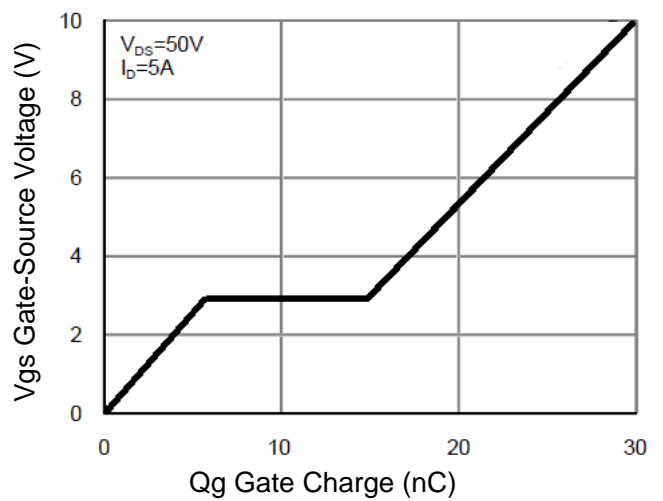


Figure 5 Gate Charge

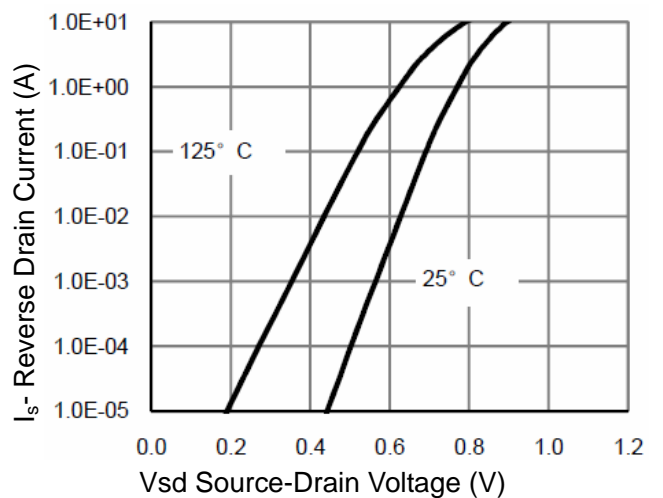


Figure 6 Source- Drain Diode Forward

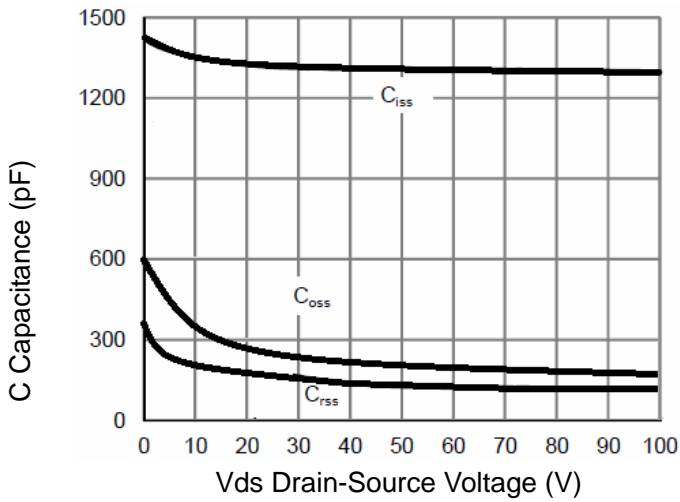


Figure 7 Capacitance vs Vds

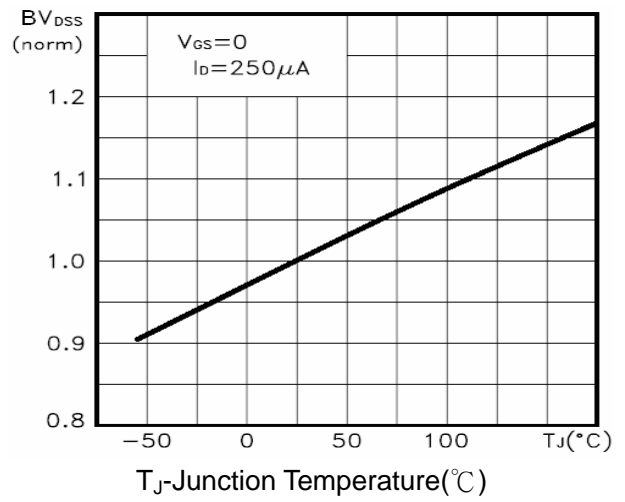


Figure 9  $BV_{DSS}$  vs Junction Temperature

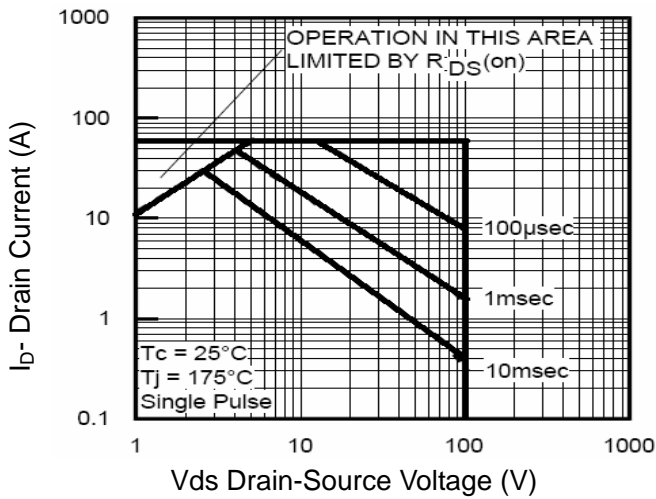


Figure 8 Safe Operation Area

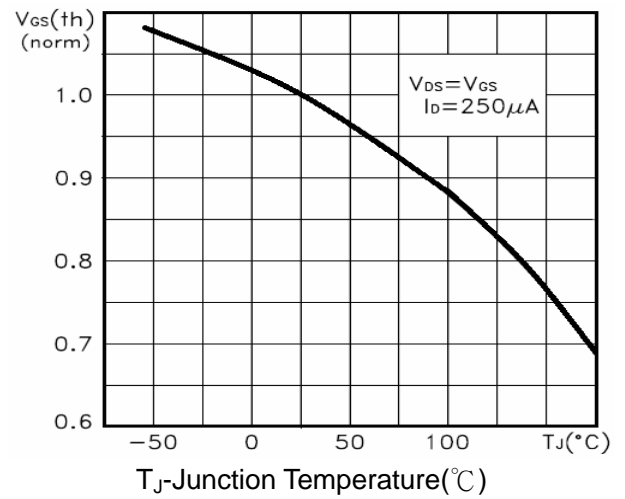


Figure 10  $V_{GS(th)}$  vs Junction Temperature

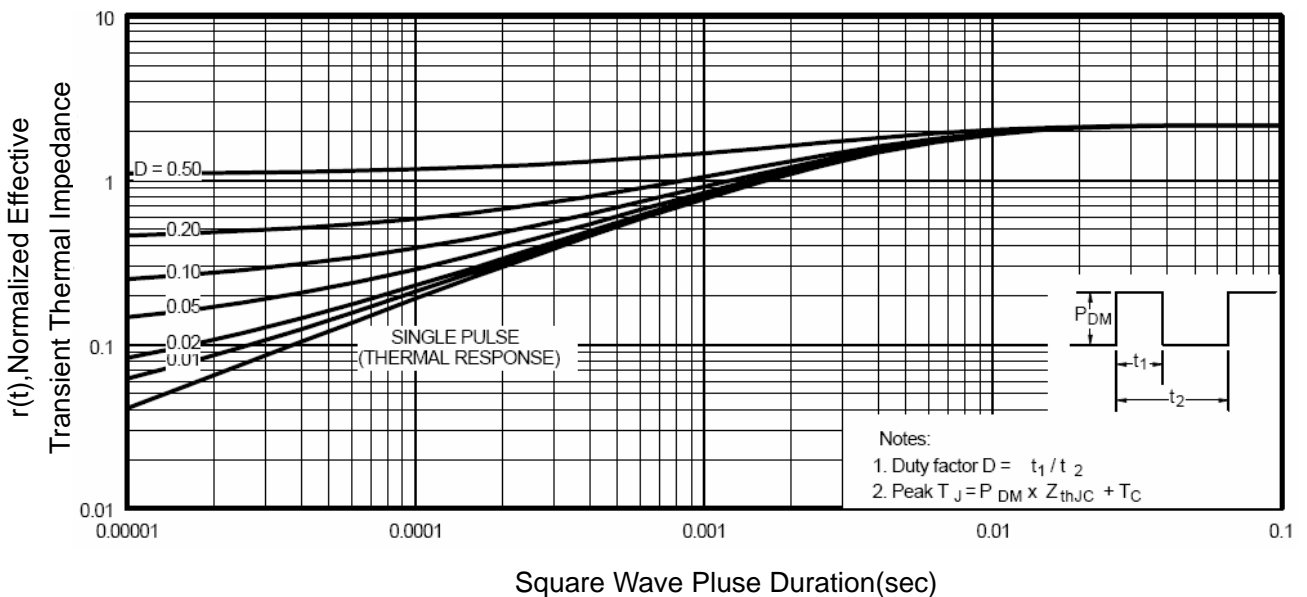
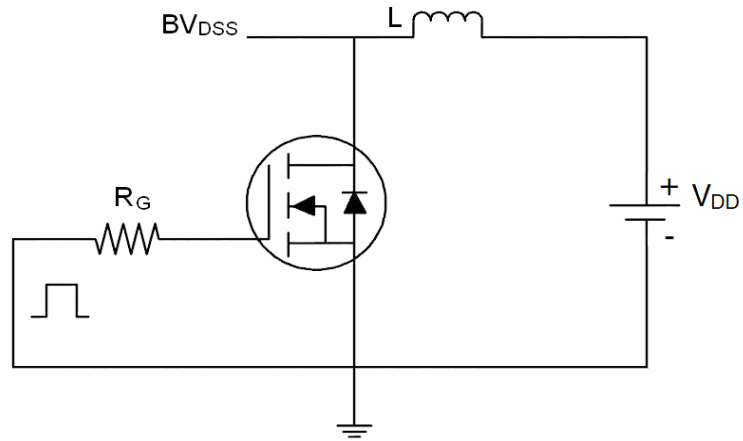


Figure 11 Normalized Maximum Transient Thermal Impedance

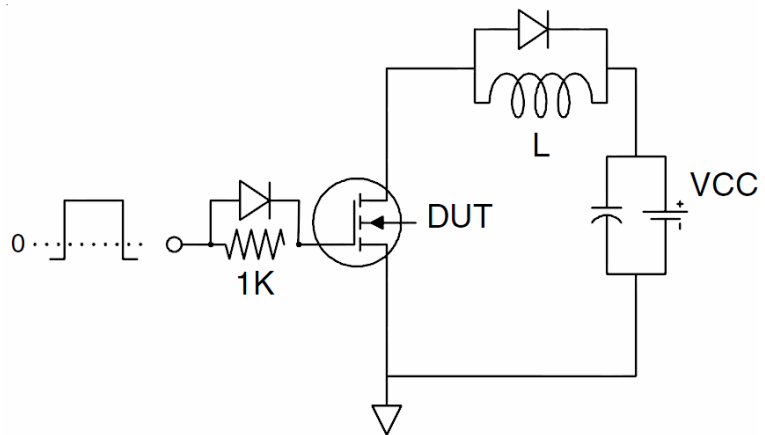


### Test Circuit

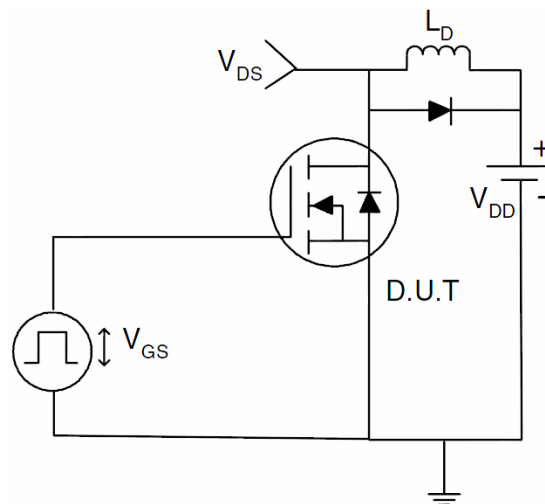
#### 1) $E_{AS}$ test Circuit



#### 2) Gate charge test Circuit



#### 3) Switch Time Test Circuit

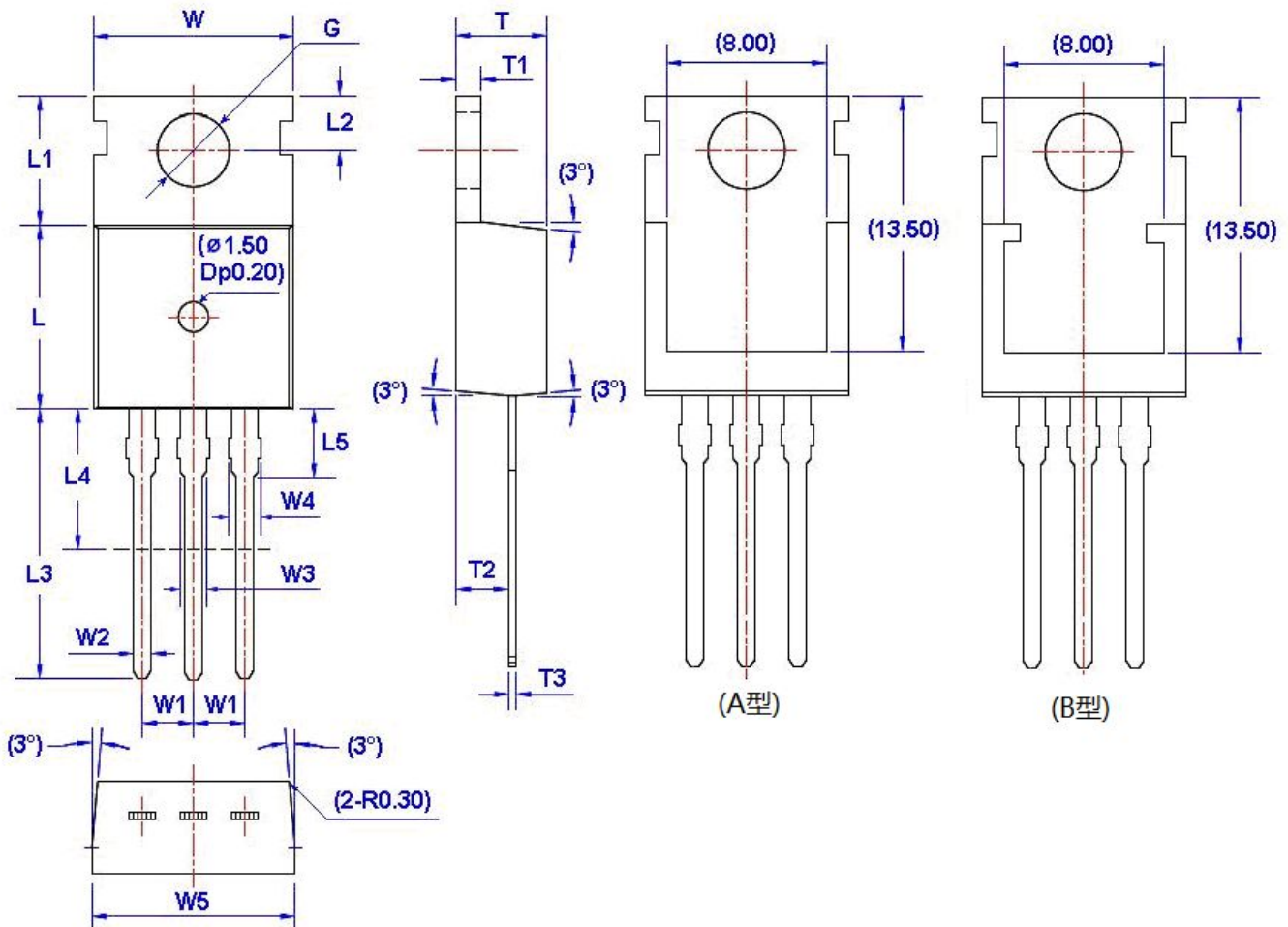




**Package Dimension**

TO-220

Unit:mm



Symbol	Size		Symbol	Size		Symbol	Size		Symbol	Size	
	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			