
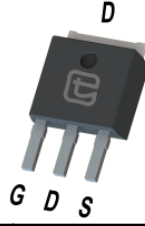
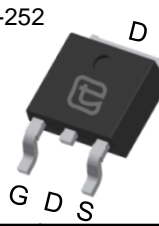
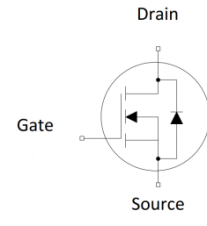


**68V N-Channel Trench MOSFET(Preliminary)**

<p><b>General Description</b></p> <ul style="list-style-type: none"> <li>● Trench Power Technology</li> <li>● Low <math>R_{DS(ON)}</math></li> <li>● Low Gate Charge</li> <li>● Optimized for Fast-switching Applications`</li> </ul> <p><b>Applications</b></p> <ul style="list-style-type: none"> <li>● Synchronous Rectification in DC/DC and AC/DC Converters</li> <li>● Isolated DC/DC Converters in Telecom and Industrial</li> </ul>	<p><b>Product Summary</b></p> <table> <tr> <td><math>V_{DS}</math></td> <td>68V</td> </tr> <tr> <td><math>I_D</math> (at <math>V_{GS}=10V</math>)</td> <td>95A</td> </tr> <tr> <td><math>R_{DS(ON)}</math> (at <math>V_{GS}=10V</math>)</td> <td>&lt; 7.5m<math>\Omega</math></td> </tr> </table> <p>100% UIS Tested</p> 	$V_{DS}$	68V	$I_D$ (at $V_{GS}=10V$ )	95A	$R_{DS(ON)}$ (at $V_{GS}=10V$ )	< 7.5m $\Omega$
$V_{DS}$	68V						
$I_D$ (at $V_{GS}=10V$ )	95A						
$R_{DS(ON)}$ (at $V_{GS}=10V$ )	< 7.5m $\Omega$						

TO-251		TO-252		
<b>Device</b>	<b>Package</b>	<b>Form</b>	<b>Marking</b>	
TTD95N68A	TO-252	Tape&Reel	95N68A	
TTU95N68A	TO-251	Tape&Reel	95N68A	

<b>Absolute Maximum Ratings (<math>T_A = 25^\circ C</math> unless otherwise noted)</b>			
Parameter	Symbol	Maximum	Units
Drain-Source Voltage	$V_{DS}$	68	V
Gate-Source Voltage	$V_{GS}$	$\pm 20$	V
Continuous Drain Current	$I_D$	$T_C = 25^\circ C$	46
		$T_C = 100^\circ C$	46
Pulsed Drain Current <sup>A</sup>	$I_{DM}$	285	A
Avalanche Current <sup>A</sup>	$I_{AS}$	37	A
Single Pulse Avalanche Energy $L = 0.3mH$ <sup>A</sup>	$E_{AS}$	380	mJ
Power Dissipation <sup>C</sup>	$P_D$	$T_C = 25^\circ C$	130.5
		$T_C = 100^\circ C$	65.5
Operating Junction and Storage Temperature Range	$T_J, T_{STG}$	-55 to 175	$^\circ C$

<b>Thermal Characteristics</b>			
Parameter	Symbol	Maximum	Units
Maximum Junction-to-Case	$R_{thJC}$	1.15	$^\circ C/W$
Maximum Junction-to-Ambient			



Electrical Characteristics( $T_J = 25^\circ\text{C}$ unless otherwise noted)							
Symbol	Parameter	Conditions	Value			Units	
			Min	Typ	Max		
<b>STATIC PARAMETERS</b>							
$BV_{DSS}$	Drain-Source Breakdown Voltage	$I_D = 250\mu\text{A}, V_{GS} = 0\text{V}$	68	--	--	V	
$I_{DSS}$	Zero Gate Voltage Drain Current	$V_{DS} = 68\text{V}, V_{GS} = 0\text{V}$	$T_J = 25^\circ\text{C}$	--	--	1	$\mu\text{A}$
			$T_J = 100^\circ\text{C}$	--	--	25	
$I_{GSS}$	Gate-Body Leakage Current	$V_{DS} = 0\text{V}, V_{GS} = \pm 20\text{V}$	--	--	$\pm 100$	nA	
$V_{GS(th)}$	Gate Threshold Voltage	$V_{DS} = V_{GS}, I_D = 250\mu\text{A}$	2	3	4	V	
$R_{DS(ON)}$	Static Drain-Source On-Resistance	$V_{GS} = 10\text{V}, I_D = 30\text{A}$	--	6.5	7.5	m $\Omega$	
$g_{FS}$	Forward Transconductance	$V_{DS} = 5\text{V}, I_D = 20\text{A}$	--	30	--	S	
$V_{SD}$	Diode Forward Voltage	$I_S = 20\text{A}, V_{GS} = 0\text{V}$	--	--	1	V	
$I_S$	Maximum Body-Diode Continuous Current <sup>B</sup>		--	--	46	A	
<b>DYNAMIC PARAMETERS</b>							
$C_{iss}$	Input Capacitance	$V_{GS} = 0\text{V}, V_{DS} = 30\text{V}, f = 1\text{MHz}$	--	4169	--	$\mu\text{F}$	
$C_{oss}$	Output Capacitance		--	274	--		
$C_{rss}$	Reverse Transfer Capacitance		--	222	--		
<b>SWITCHING PARAMETERS</b>							
$Q_g(10\text{V})$	Total Gate Charge	$V_{GS} = 10\text{V}, V_{DS} = 30\text{V}, I_D = 30\text{A}$	--	70	--	nC	
$Q_{gs}$	Gate Source Charge		--	20	--		
$Q_{gd}$	Gate Drain Charge		--	18	--		
$t_{D(on)}$	Turn-On Delay Time	$V_{GS} = 10\text{V}, V_{DS} = 30\text{V}, I_D = 30\text{A}, R_G = 3\Omega$	--	15	--	ns	
$t_r$	Turn-On Rise Time		--	94	--		
$T_{D(off)}$	Turn-Off Delay Time		--	46	--		
$t_f$	Turn-Off Fall Time		--	32	--		
$t_{rr}$	Body Diode Reverse Recovery Time	$I_F = 20\text{A}, di/dt = 100\text{A}/\mu\text{s}$	--	78	--	ns	
$Q_{rr}$	Body Diode Reverse Recovery Charge		--	51	--	nC	

A. Single pulse width limited by maximum junction temperature.

B. The maximum current rating is package limited.

C. The power dissipation  $P_D$  is based on  $T_{J(MAX)} = 175^\circ\text{C}$ , using junction-to-case thermal resistance, and is more useful in setting the upper dissipation limit for cases where additional heatsinking is used.



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

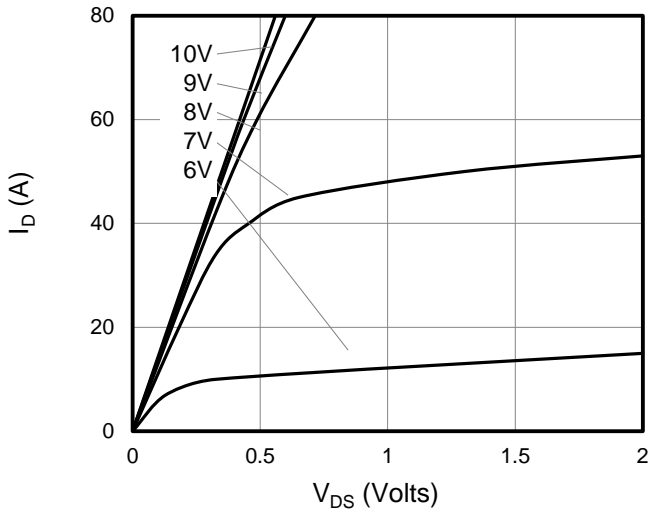


Figure 1: On-Region Characteristics

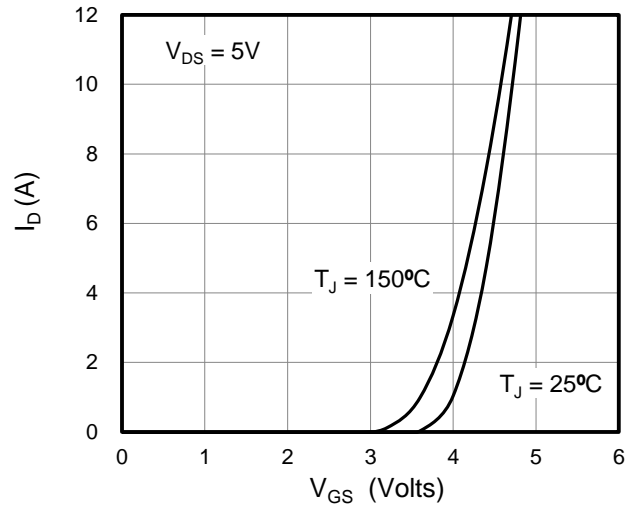


Figure 2: Transfer Characteristics

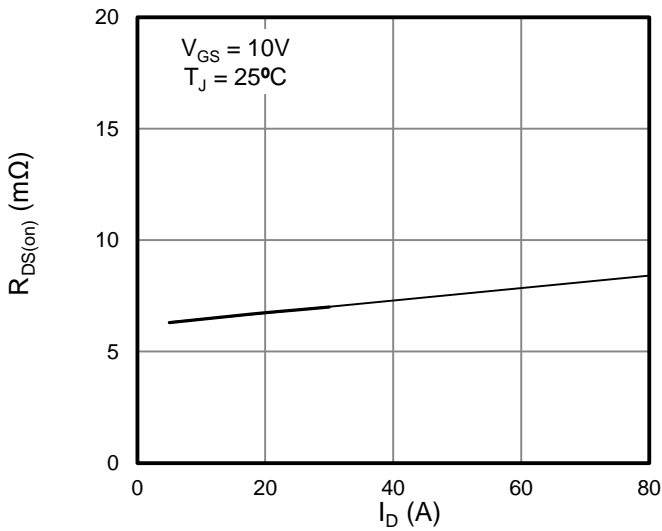


Figure 3: On-Resistance vs. Drain Current

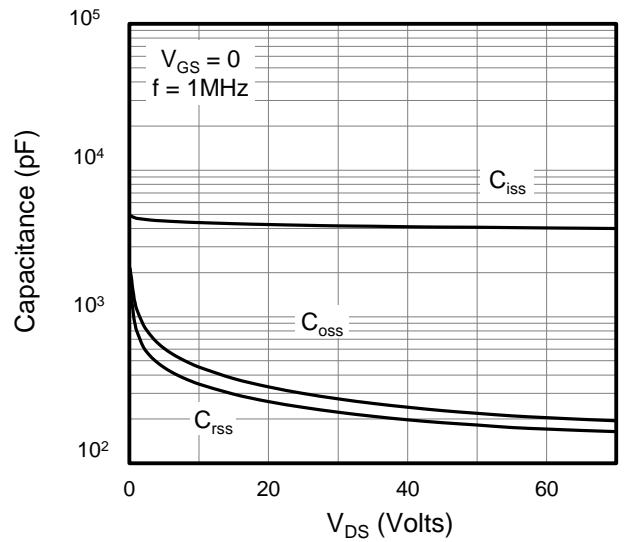


Figure 4: Capacitance Characteristics

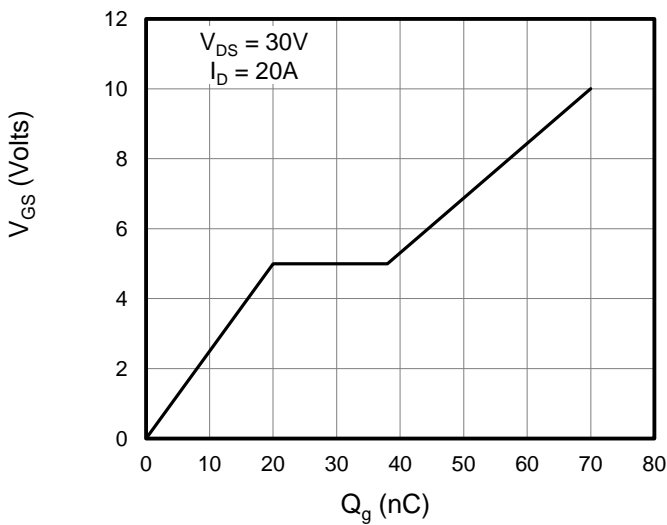


Figure 5: Gate Charge Characteristics

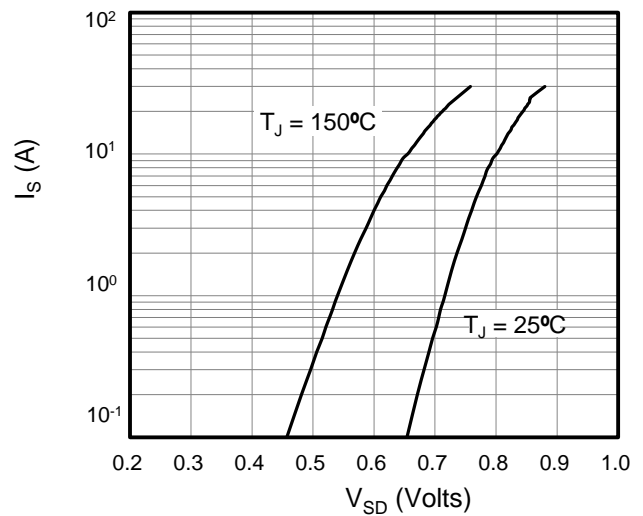


Figure 6: Body Diode Forward Voltage



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

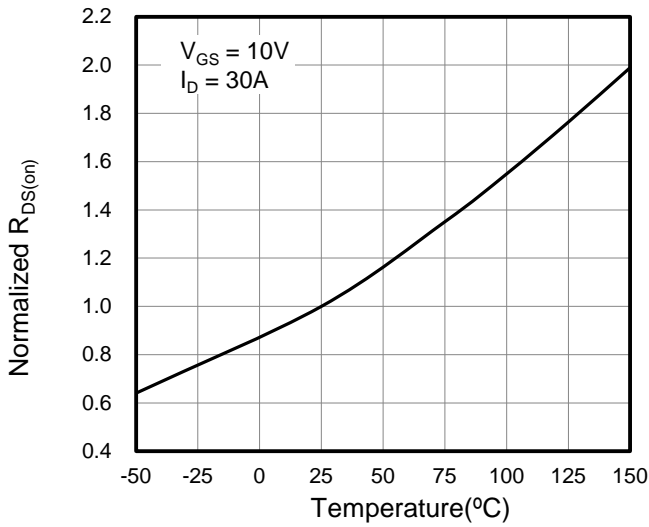


Figure 7: On-Resistance vs. Junction Temperature

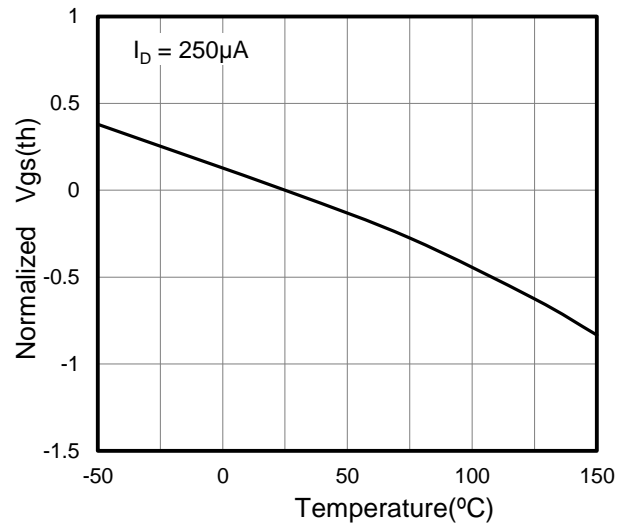


Figure 8:  $V_{GS(th)}$  vs. Junction Temperature

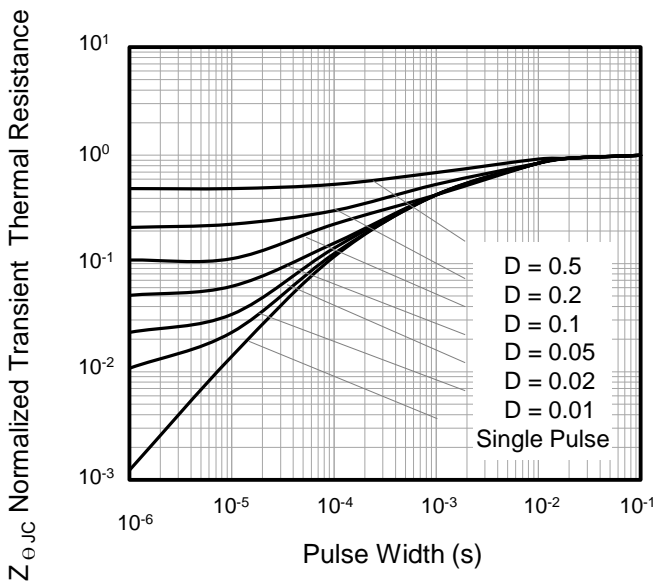


Figure 9: Normalized Transient Thermal Resistance

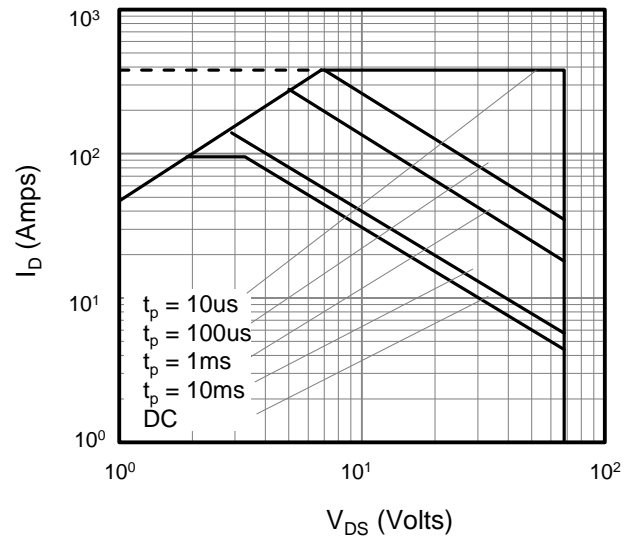


Figure 10: Safe Operating Area



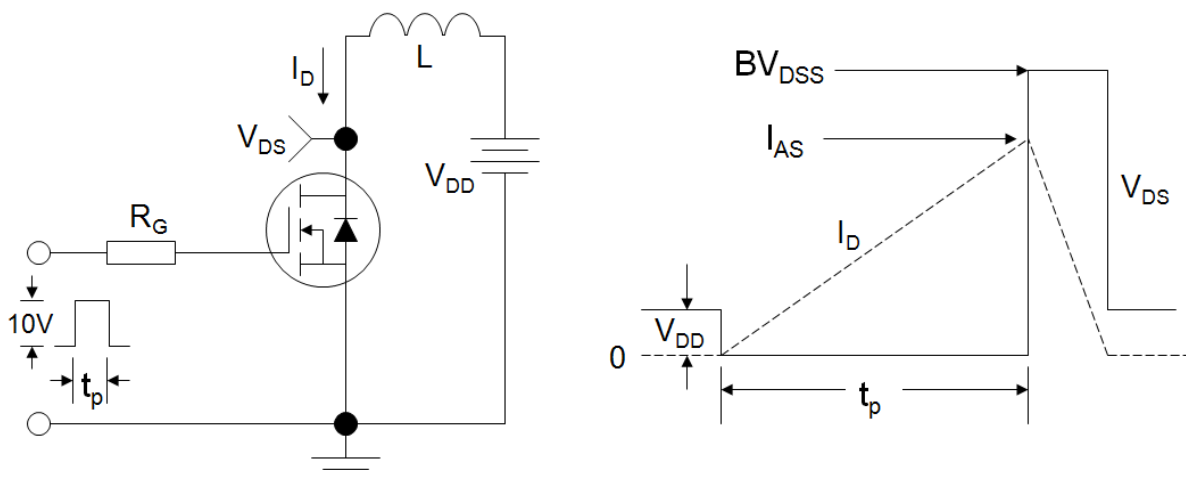
Figure A: Gate Charge Test Circuit and Waveform



Figure B: Resistive Switching Test Circuit and Waveform

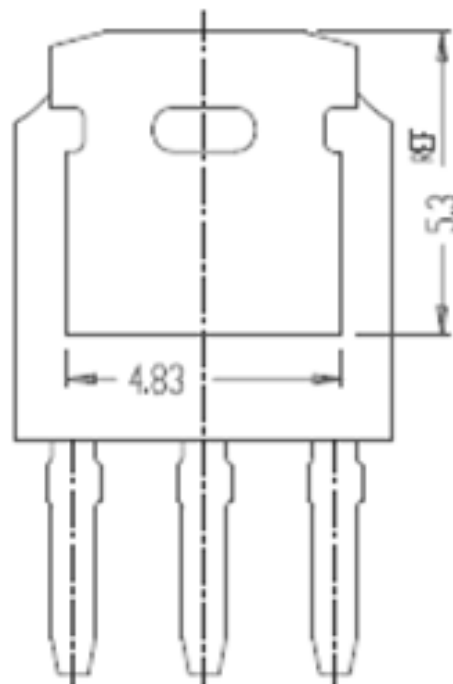
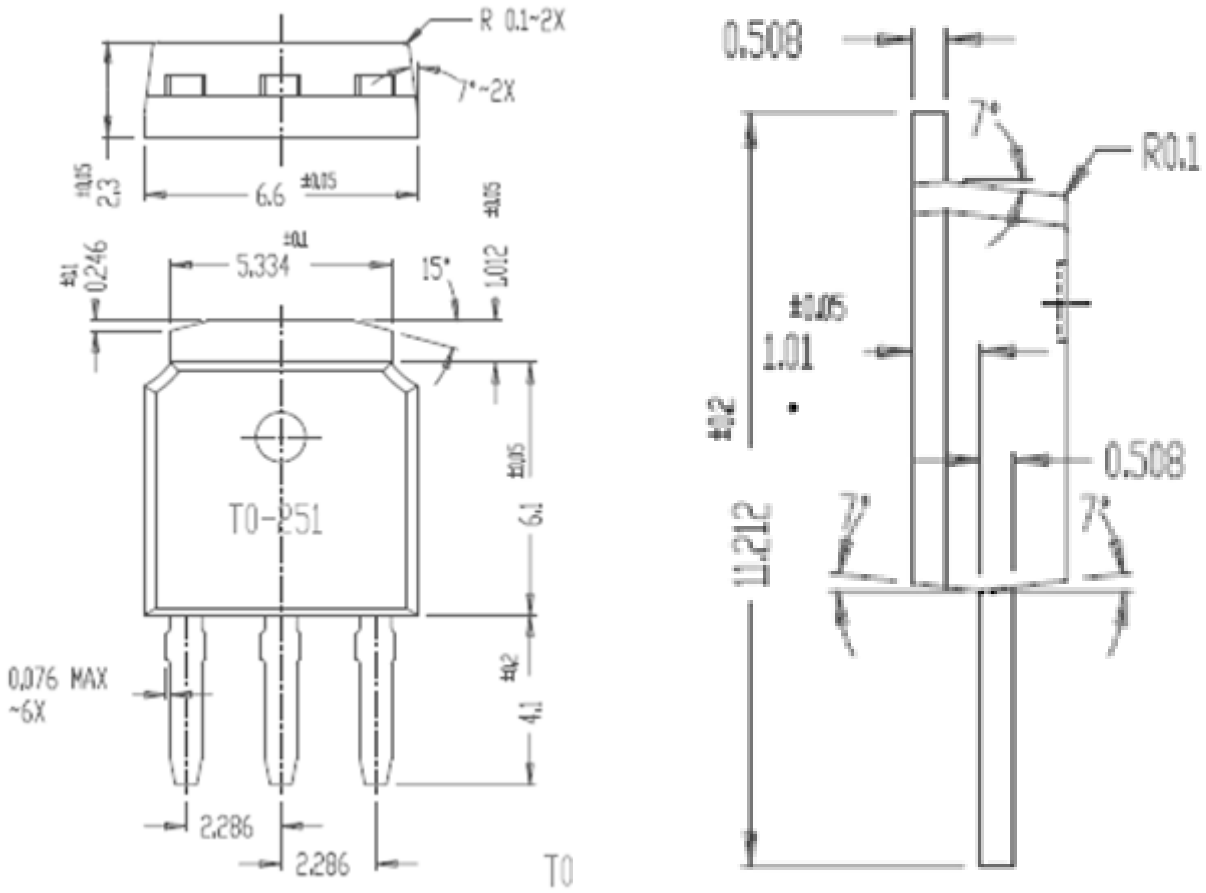


Figure C: Unclamped Inductive Switching Test Circuit and Waveform



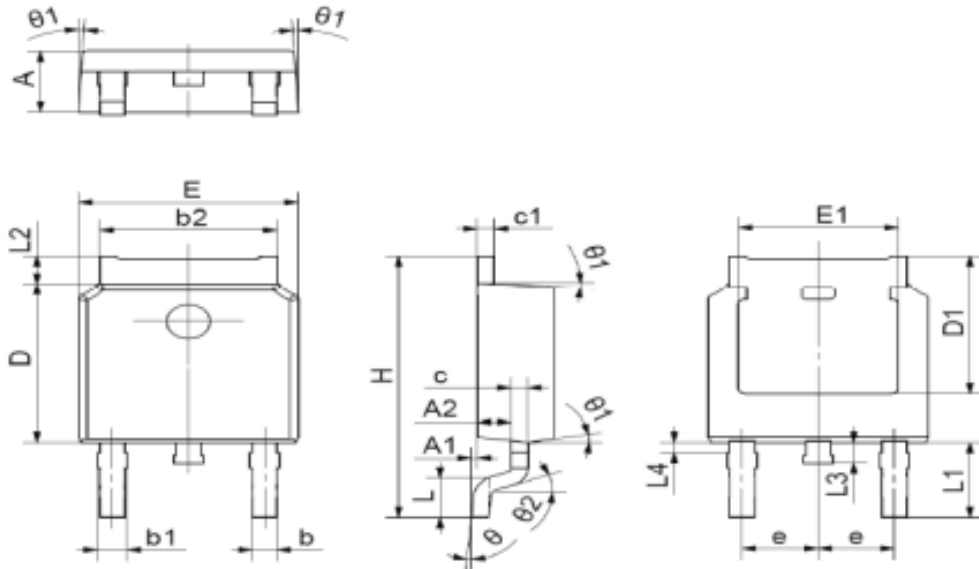


### TO-251(T)





# TO-252(E)

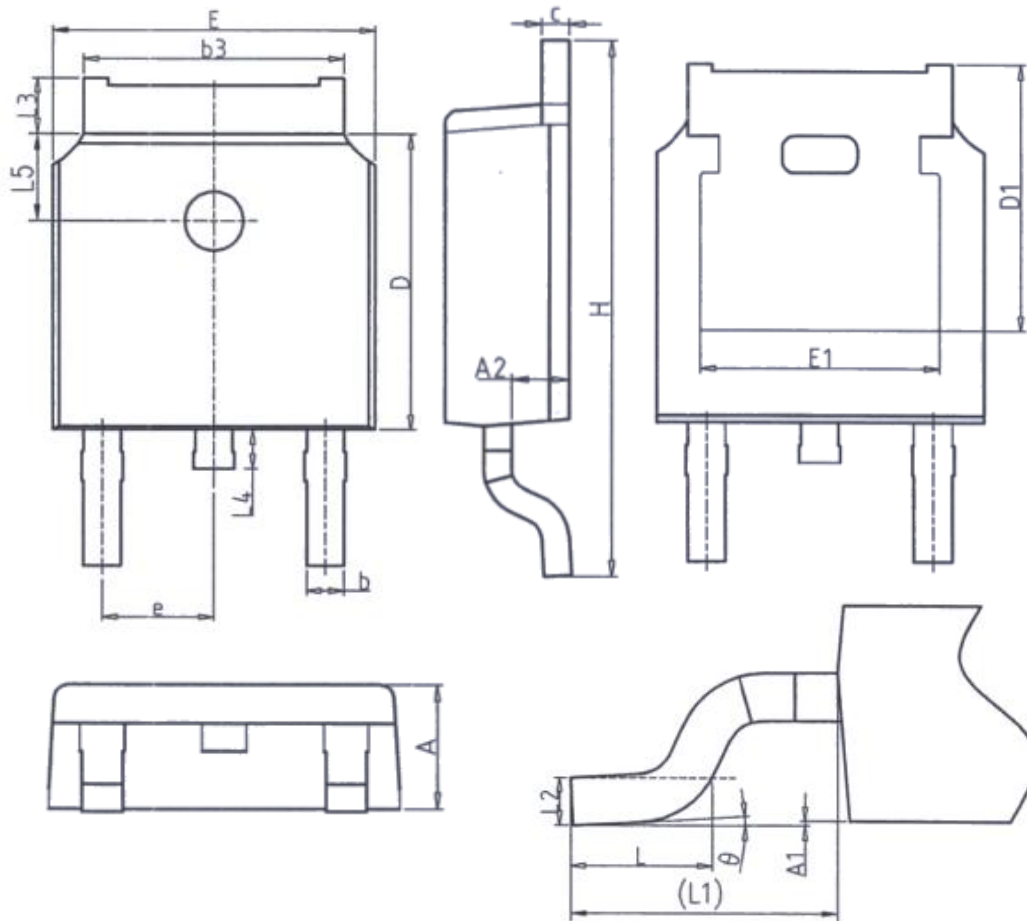


Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	2.10	2.50	0.083	0.098
A1	0	0.15	0.000	0.006
A2	0.76	1.36	0.030	0.054
b	0.61	0.85	0.024	0.033
b1	0.71	0.91	0.028	0.036
b2	5.04	5.64	0.198	0.222
c	0.508 TYP.		0.02 TYP.	
c1	0.508 TYP.		0.02 TYP.	
D	5.8	6.3	0.228	0.248
D1	5	5.6	0.197	0.220
E	6.3	6.9	0.248	0.272
E1	4.55	5.15	0.179	0.203
e	2.286 TYP.		0.09 TYP.	
H	9.65	10.4	0.380	0.409
L	1.4	1.7	0.055	0.067
L1	2.90 REF.		0.114 REF.	
L2	0.75	1.35	0.030	0.053
L3	0.6	1.2	0.024	0.047
theta	0°	10°	0°	10°
theta1	5°	9°	5°	9°
theta2	25° REF.		25° REF.	

关键尺寸										
A	A1	b	D	E	E1	e	H	D	L1	



## TO-252(H)



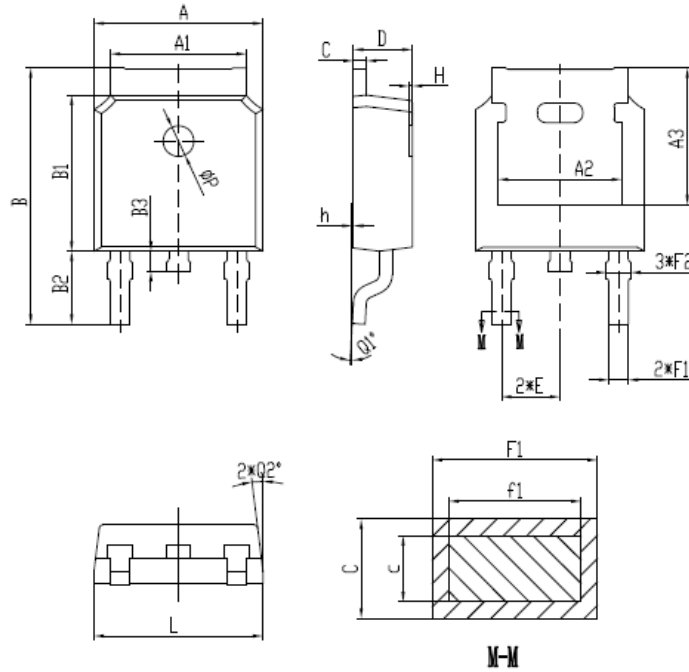
Unit: mm		
Symbol	Min.	Max.
A	2.20	2.40
A1	0.00	0.20
A2	0.97	1.17
b	0.68	0.90
b3	5.20	5.50
c	0.43	0.63
D	5.98	6.22
D1	5.30REF	
E	6.40	6.80
E1	4.63	-

Unit: mm		
Symbol	Min.	Max.
e	2.286BSC	
H	9.40	10.50
L	1.38	1.75
L1	2.90REF	
L2	0.51BSC	
L3	0.88	1.28
L4	-	1.00
L5	1.65	1.95
$\theta$	0°	8°





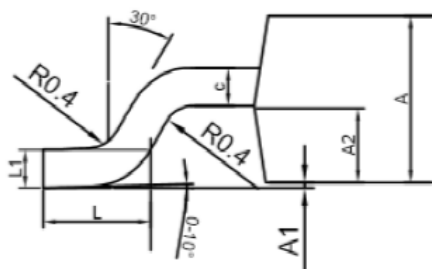
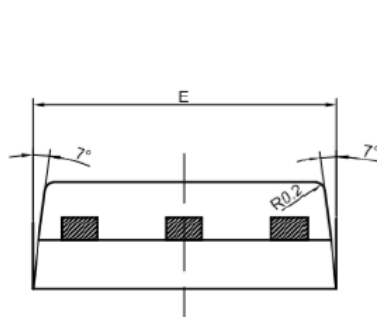
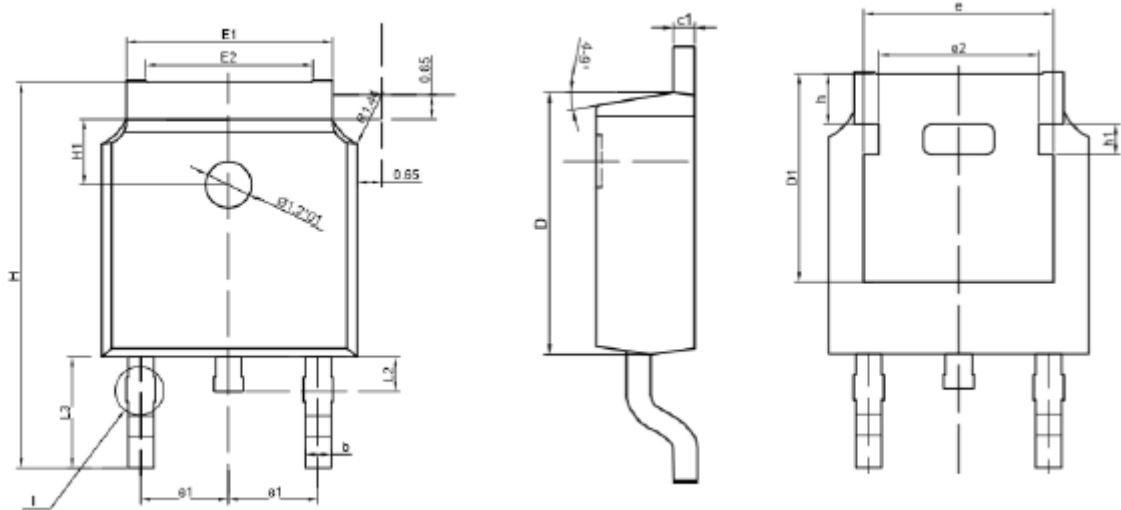
## TO-252(T)



SYMBOL	MIN	NOM	MAX
A	6.50	6.60	6.70
A1	5.16	5.31	5.46
A2	4.83 REF		
A3	5.30 REF		
B	9.77	9.97	10.17
B1	6.00	6.10	6.20
B2	2.60	2.80	3.00
B3	0.70	0.80	0.90
C	0.41	—	0.61
c	0.40	0.50	0.60
D	2.20	2.30	2.40
E	2.186	2.286	2.386
F1	0.67	—	0.87
f1	0.66	0.76	0.86
F2	0.76	0.86	0.96
H	0.00	—	0.30
h	0.00	—	0.20
L	6.50	6.60	6.70
$\phi P$	1.10	1.20	1.30
$Q1^\circ$	0°	—	8°
$Q2^\circ$	6°	7°	8°



### TO-252(Q)



SYMBOL	MIN	NOM	MAX
A	2.29	2.30	2.31
A1	0.00	0.07	0.15
A2	1.020	1.025	1.030
b	0.645	0.670	0.695
b1	0.67	0.77	0.87
c	0.523	0.528	0.533
c1	0.498	0.508	0.518
D	6.09	6.10	6.11
D1	5.244	5.249	5.254
E	6.50	6.60	6.70
E1	5.284	5.334	5.384
E2	4.284	4.334	4.312
e	4.821	4.826	4.831
e1	2.281	2.286	2.291
e2	4.059	4.064	4.069
H	9.8	10.0	10.2
H1	1.5	1.6	1.7
h	1.316	1.321	1.326
h1	0.757	0.762	0.767
L	1.4	1.5	1.6
L1	0.50	0.51	0.52
L2	0.8	0.9	1.0
L3	2.88	2.888	2.893



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