

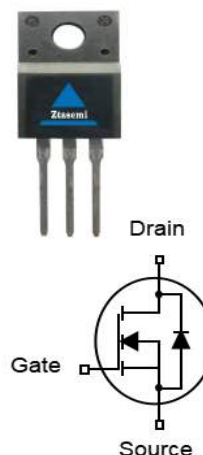
## Features

- N-Channel
- Very low FOM  $R_{DS(on)} \times Q_g$
- 100% avalanche tested
- Easy to use/drive
- RoHS compliant
- 100% EAS Tested

$V_{DS}$	650	V
$R_{DS(on),TYP}@ V_{GS}=10V$	300	m $\Omega$
$I_D$	11	A



Part ID	Package Type	Marking	Packing
ZT65R360F	TO-220F	ZT65R360F	1000pcs/Tape

**TO-220F**


## Absolute Maximum Ratings $T_A=25^\circ\text{C}$ , unless otherwise specified

Symbol	Parameter	Rating	Unit	
<b>Common Ratings (<math>T_c=25^\circ\text{C}</math> Unless Otherwise Noted)</b>				
$V_{GS}$	Gate-Source Voltage	$\pm 30$	V	
$V_{(BR)DSS}$	Drain-Source Breakdown Voltage	650	V	
$T_J$	Maximum Junction Temperature	150	$^\circ\text{C}$	
$T_{STG}$	Storage Temperature Range	-55 to 150	$^\circ\text{C}$	
$I_{DM}$	Drain Current-Continuous@ Current-Pulsed (Note 2)	$T_c=25^\circ\text{C}$ 33	A	
<b>Mounted on Large Heat Sink</b>				
$I_D$	Drain Current-Continuous (Note 1)	$T_c=25^\circ\text{C}$	11	A
		$T_c=100^\circ\text{C}$	6.6	A
$P_D$	Maximum Power Dissipation	83	W	
$R_{\theta JC}$	Thermal Resistance-Junction to Case	4	$^\circ\text{C/W}$	
$R_{\theta JA}$	Thermal Resistance, Junction-to-Ambient	80	$^\circ\text{C/W}$	
<b>Drain-Source Avalanche Ratings</b>				
EAS	Avalanche Energy, Single Pulsed	215	mJ	
EAR	Repetitive Avalanche Energy	0.32	mJ	
dv/dt	Reverse Diode dv/dt (Note 3)	15	V/ns	

**Electrical Characteristics (T<sub>J</sub>=25°C unless otherwise noted)**

Symbol	Parameter	Condition	Min	Typ	Max	Unit
<b>Static Electrical Characteristics @ T<sub>J</sub>=25°C (unless otherwise stated)</b>						
V(BR)DSS	Drain-Source Breakdown Voltage	V <sub>GS</sub> =0V, I <sub>D</sub> =250μA	650	--	--	V
I <sub>DSS</sub>	Zero Gate Voltage Drain Current	V <sub>DS</sub> =650V, V <sub>GS</sub> =0V	--	--	1	μA
I <sub>GSS</sub>	Gate-Body Leakage Current	V <sub>GS</sub> =±30V, V <sub>DS</sub> =0V	--	--	±100	nA
V <sub>GS(th)</sub>	Gate Threshold Voltage	V <sub>DS</sub> =V <sub>GS</sub> , I <sub>D</sub> =250μA	2.5	3.6	4.5	V
R <sub>DS(on)</sub>	Drain-Source On-State Resistance	V <sub>GS</sub> =10V, I <sub>D</sub> =5.5A	--	300	380	mΩ
<b>Dynamic Electrical Characteristics @ T<sub>J</sub> = 25°C (unless otherwise stated)</b>						
C <sub>iss</sub>	Input Capacitance	V <sub>DS</sub> =100V, V <sub>GS</sub> =0V, f=1MHz	--	811	--	pF
C <sub>oss</sub>	Output Capacitance		--	29	--	pF
C <sub>rss</sub>	Reverse Transfer Capacitance		--	2.1	--	pF
R <sub>g</sub>	Gate Resistance	f=1MHz	--	4.8	--	Ω
Q <sub>g</sub>	Total Gate Charge	V <sub>DD</sub> =520V, I <sub>D</sub> =11A, V <sub>GS</sub> =10V	--	23.1	--	nC
Q <sub>gs</sub>	Gate-Source Charge		--	6.6	--	nC
Q <sub>gd</sub>	Gate-Drain Charge		--	9.0	--	nC
<b>Switching Characteristics (Note 2)</b>						
T <sub>d(on)</sub>	Turn-on Delay Time	V <sub>DD</sub> =400V, I <sub>D</sub> =11A, R <sub>G</sub> =15Ω, V <sub>GS</sub> =10V	--	15	--	ns
T <sub>r</sub>	Turn-on Rise Time		--	25	--	ns
T <sub>d(off)</sub>	Turn-Off Delay Time		--	80	--	ns
T <sub>f</sub>	Turn-Off Fall Time		--	35	--	ns
<b>Source- Drain Diode Characteristics @ T<sub>J</sub> = 25°C (unless otherwise stated)</b>						
V <sub>SD</sub>	Forward on voltage	I <sub>S</sub> =5.5A, V <sub>GS</sub> =0V	--	--	1.2	V
T <sub>rr</sub>	Reverse Recovery Time	T <sub>J</sub> =25°C, I <sub>F</sub> =5.5A, V <sub>R</sub> =400V di/dt=100A/μs	--	330	--	ns
Q <sub>rr</sub>	Reverse Recovery Charge		--	2.8	--	nC
I <sub>rrm</sub>	Peak Reverse Recovery Current		--	17	--	A

**Notes:**

- Limited by maximum junction temperature.
- Repetitive Rating: Pulse width limited by maximum junction temperature.
- Identical low side and high side switch with identical R<sub>G</sub>.

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

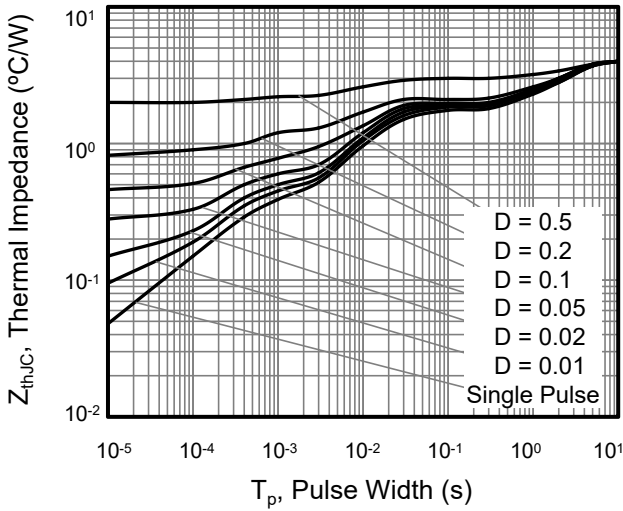


Figure 1. Transient Thermal Impedance

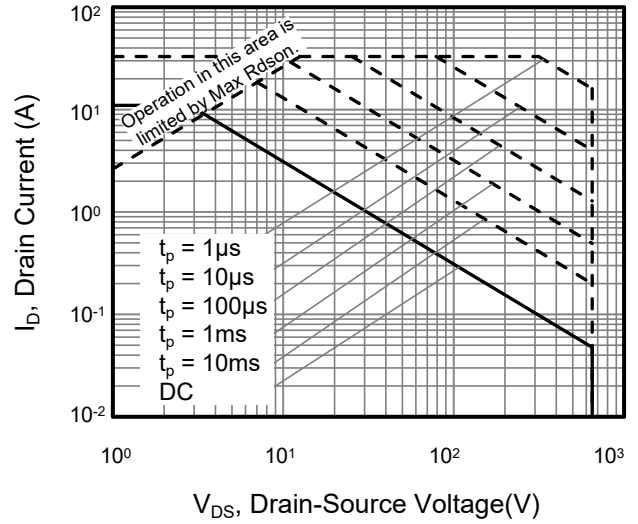


Figure 4. Safe Operation Area

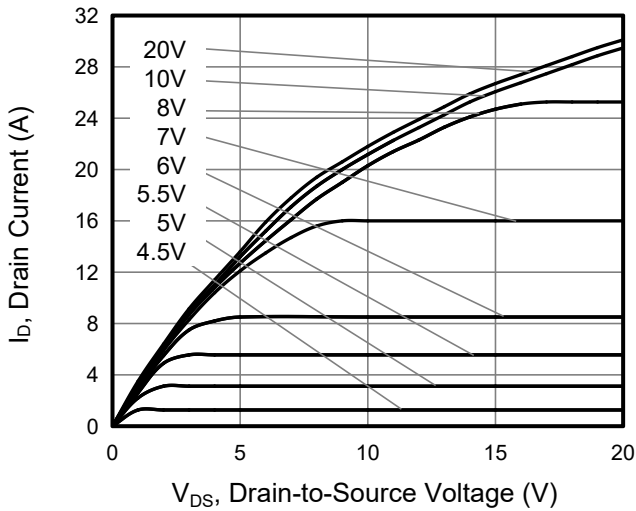


Figure 2. Output Characteristics

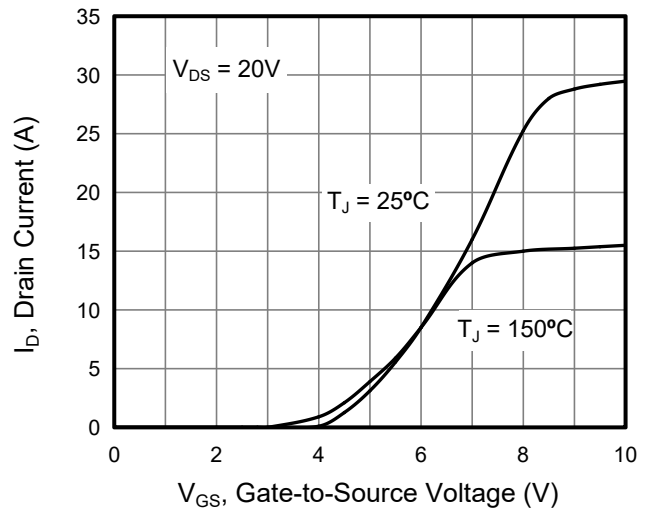


Figure 5. Transfer Characteristics

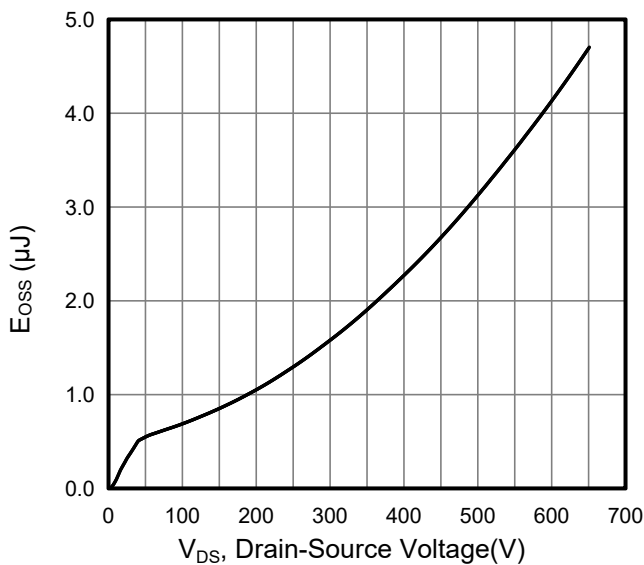


Figure 3. Typ. Coss Stored Energy

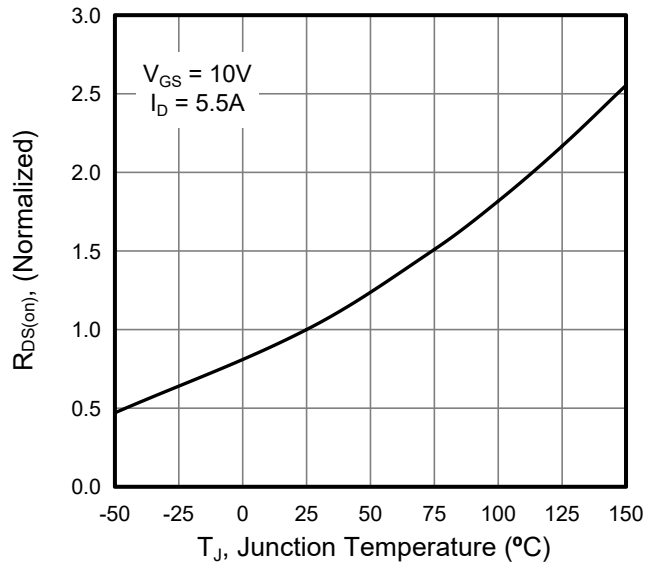


Figure 6. On-Resistance vs Temperature

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

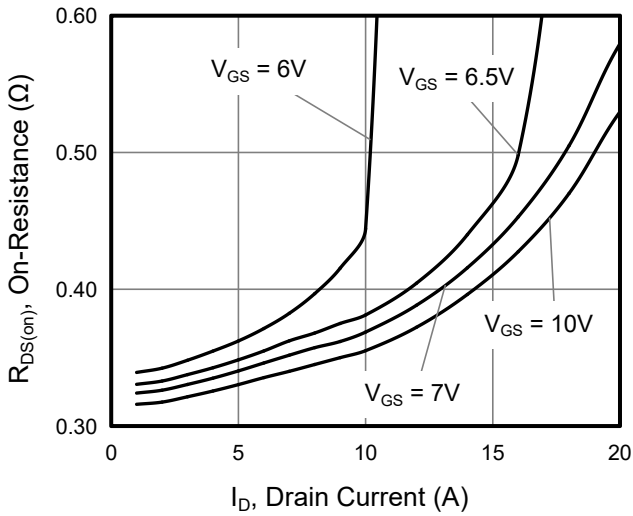


Figure 7. On-Resistance vs Drain Current

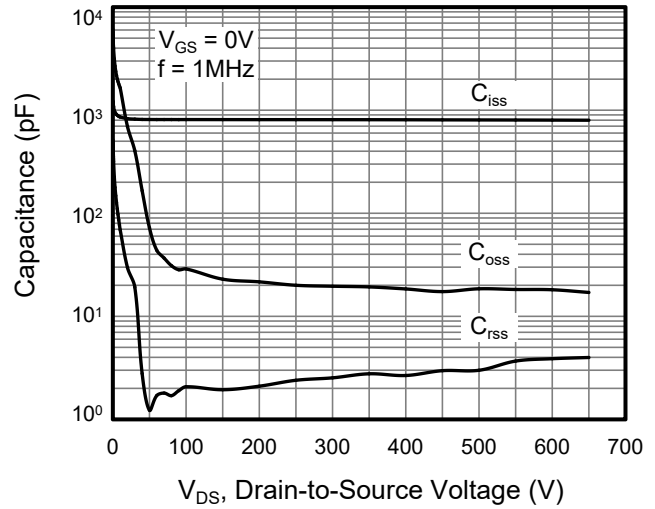


Figure 9. Capacitance

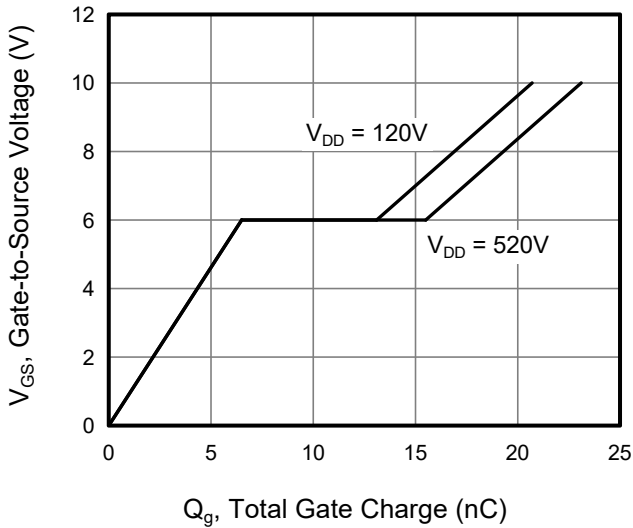


Figure 8. Gate Charge

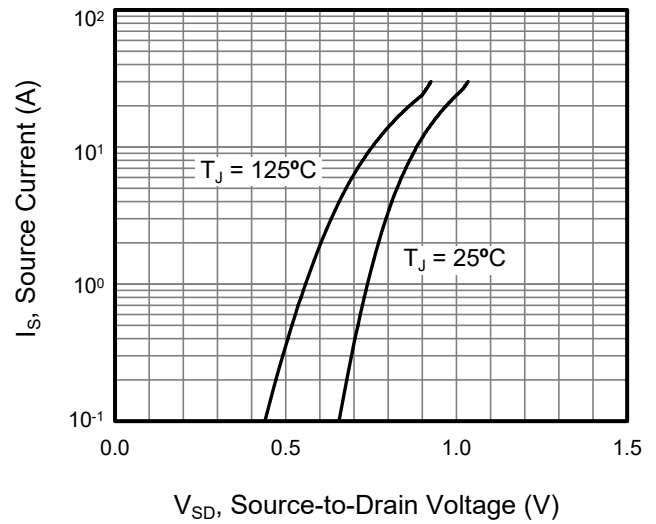


Figure 10. Body Diode Forward Voltage

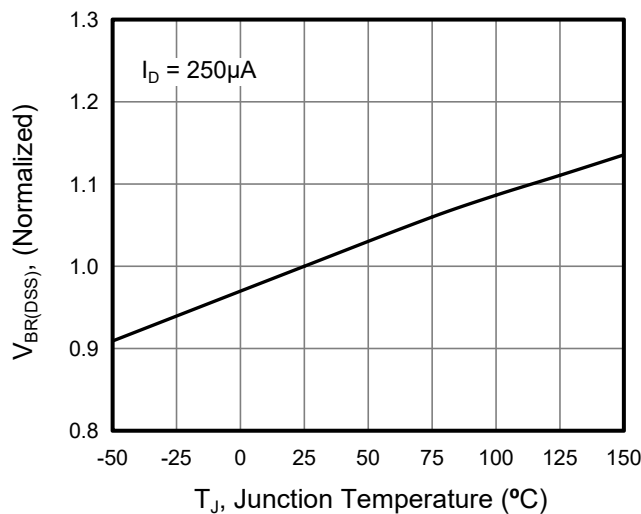


Figure 11. Breakdown Voltage vs Junction Temperature

Figure A: Gate Charge Test Circuit and Waveform

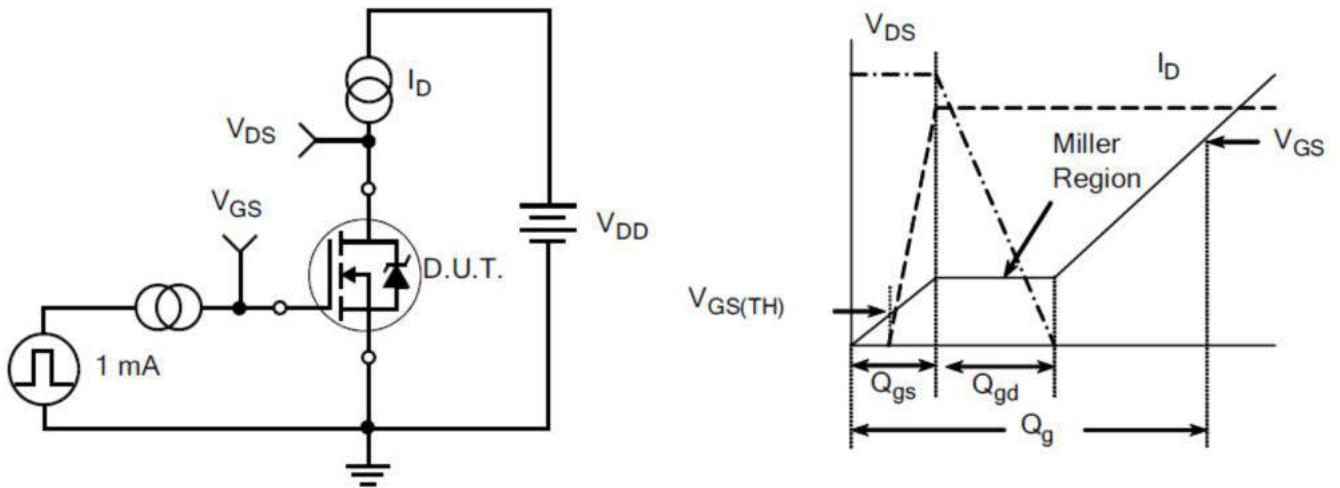


Figure B: Resistive Switching Test Circuit and Waveform

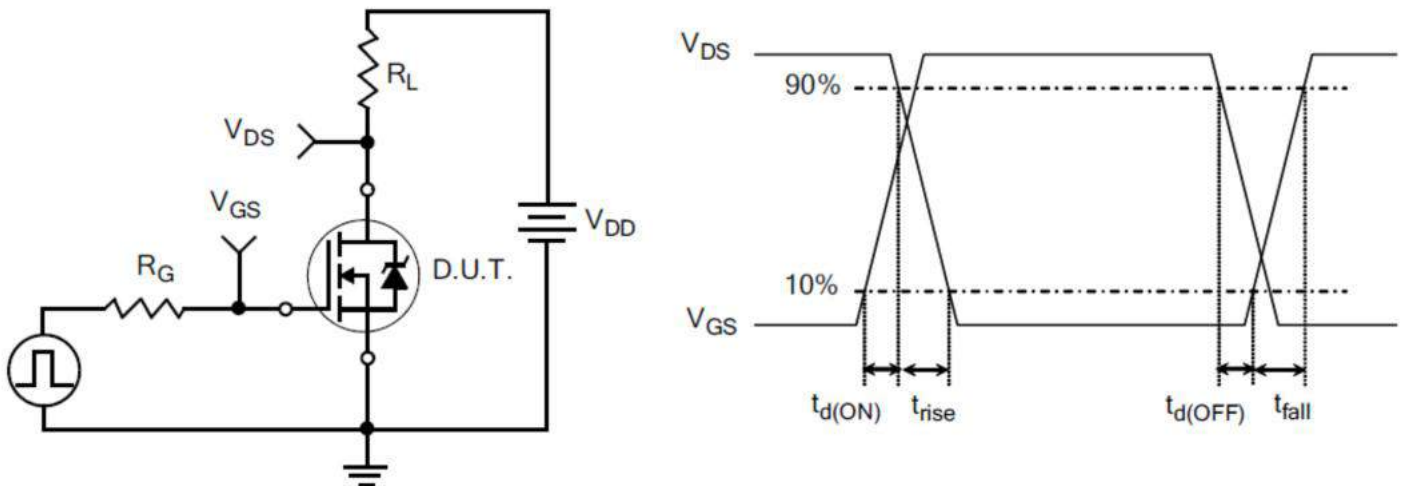
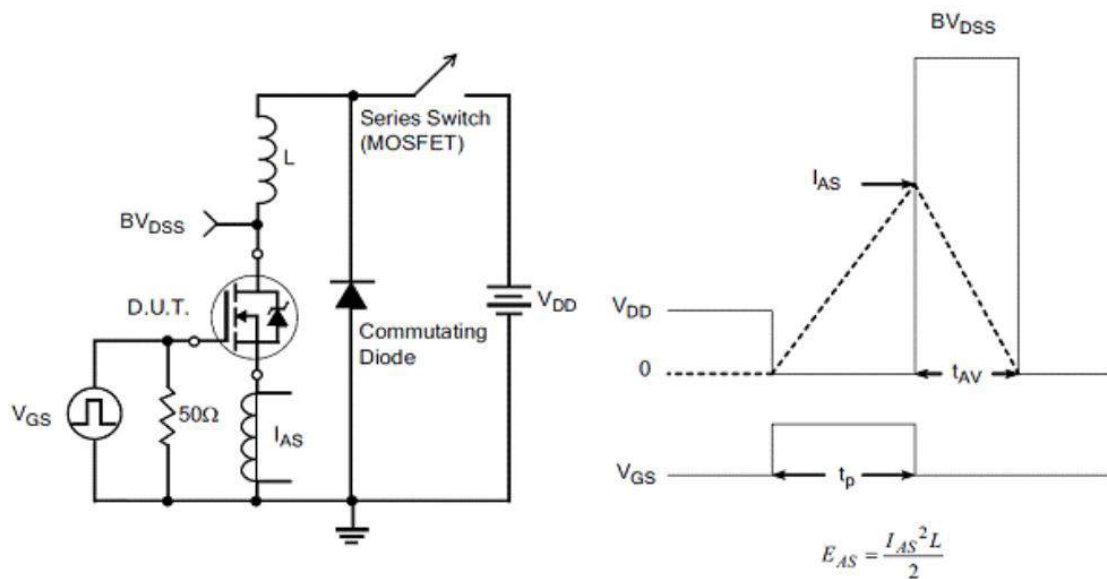
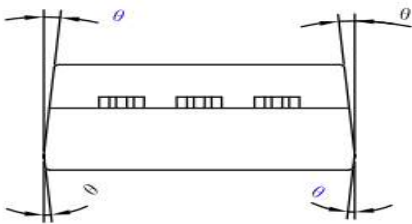
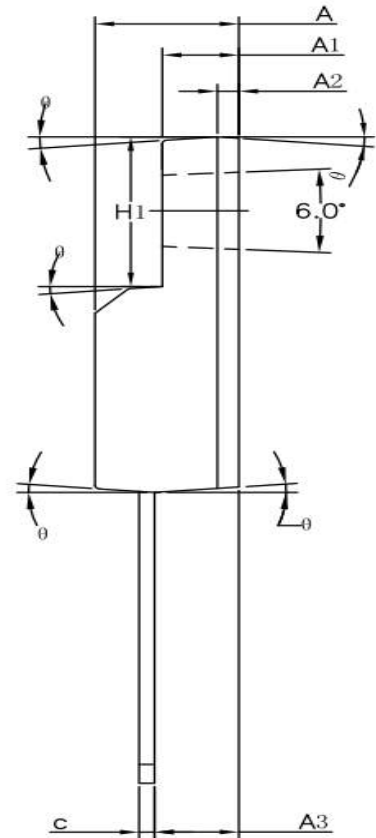
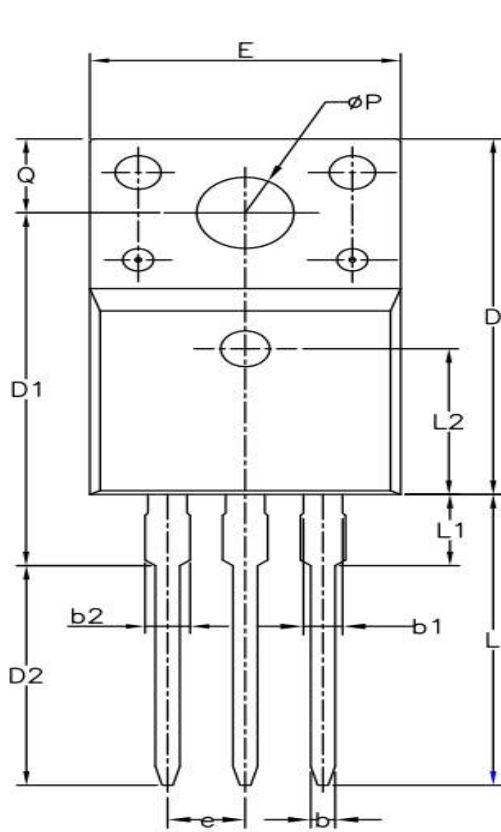


Figure C: Unclamped Inductive Switching Test Circuit and Waveform



## TO-220-3L Package Information



SYMBOL	MIN	NOM	MAX
A	4.50	4.70	4.83
A1	2.34	2.54	2.74
A2	0.70 REF		
A3	2.56	2.76	2.93
b	0.70	—	0.90
b1	1.18	—	1.38
b2	—	—	1.47
c	0.45	0.50	0.60
D	15.67	15.87	16.07
D1	15.55	15.75	15.95
D2	9.60	9.80	10.0
E	9.96	10.16	10.36
e	2.54BSC		
H1	6.48	6.68	6.88
L	12.68	12.98	13.28
L1	—	—	3.50
L2	6.50REF		
∅P	3.08	3.18	3.28
Q	3.20	—	3.40
θ 1	1°	3°	5°

## Customer Service

Sales and Service:

[zj@ztasemi.com](mailto:zj@ztasemi.com)