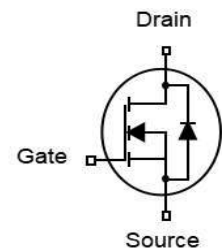


## Features

- N-Channel
- Low gate Charge
- Low Crss
- Fast switching capability
- Improved dv/dt capability
- Halogen free and RoHS compliant
- 100% EAS Tested

$V_{DS}$	650	V
$R_{DS(on),TYP}@ V_{GS}=10V$	0.27	$\Omega$
$I_D$	25	A

**TO-3P**


Part ID	Package Type	Marking	Packing
ZT25N65P	TO-3P	ZT25N65P	450pcs/Tape

## 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)	$T_C=25^\circ\text{C}$ 100	A	
<b>Mounted on Large Heat Sink</b>				
$I_D$	Drain Current-Continuous (Note 1)	$T_C=25^\circ\text{C}$	25	A
		$T_C=100^\circ\text{C}$	15.5	A
$P_D$	Maximum Power Dissipation	380	W	
$R_{\theta JC}$	Thermal Resistance-Junction to Case	0.33	$^\circ\text{C/W}$	
$R_{\theta JA}$	Thermal Resistance, Junction-to-Ambient	62	$^\circ\text{C/W}$	
<b>Drain-Source Avalanche Ratings</b>				
EAS	Avalanche Energy, Single Pulsed (Note 3)	1870	mJ	
dv/dt	Peak Diode Recovery dv/dt (Note 4)	5	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
IDSS	Zero Gate Voltage Drain Current	V <sub>DS</sub> =650V, V <sub>GS</sub> =0V	--	--	1	μA
IGSS	Gate-Body Leakage Current	V <sub>GS</sub> =±30V, V <sub>DS</sub> =0V	--	--	±100	nA
VGS(th)	Gate Threshold Voltage	V <sub>DS</sub> =V <sub>GS</sub> , I <sub>D</sub> =250μA	2.0	--	4.0	V
RDS(on)	Drain-Source On-State Resistance	V <sub>GS</sub> =10V, I <sub>D</sub> =12.5A	--	0.27	0.35	Ω
<b>Dynamic Electrical Characteristics @ T<sub>J</sub> = 25°C (unless otherwise stated)</b>						
Ciss	Input Capacitance	V <sub>DS</sub> =25V, V <sub>GS</sub> =0V, f=1MHz	--	4698	--	pF
Coss	Output Capacitance		--	306	--	pF
Crss	Reverse Transfer Capacitance		--	3.1	--	pF
Rg	Gate Resistance	f=1MHz	--	1.2	--	Ω
Qg	Total Gate Charge	V <sub>DD</sub> =520V, I <sub>D</sub> =25A, V <sub>GS</sub> =10V	--	79	--	nC
Qgs	Gate-Source Charge		--	25	--	nC
Qgd	Gate-Drain Charge		--	22	--	nC
Vplateau	Gate plateau voltage		--	5.5	--	V
<b>Switching Characteristics (Note 2)</b>						
Td(on)	Turn-on Delay Time	V <sub>DD</sub> =325V, I <sub>D</sub> =25A, R <sub>G</sub> =25Ω, V <sub>GS</sub> =10V	--	85	--	ns
Tr	Turn-on Rise Time		--	143	--	ns
Td(off)	Turn-Off Delay Time		--	170	--	ns
Tf	Turn-Off Fall Time		--	109	--	ns
<b>Source- Drain Diode Characteristics @ T<sub>J</sub> = 25°C (unless otherwise stated)</b>						
IS	Diode Forward Current (Note 3)		--	--	25	A
VSD	Forward on voltage	I <sub>S</sub> =25A, V <sub>GS</sub> =0V	--	--	1.2	V
Trr	Reverse Recovery Time	T <sub>J</sub> =25°C, I <sub>F</sub> =25A, V <sub>R</sub> =400V,	--	1208	--	ns
Qrr	Reverse Recovery Charge	di/dt=100A/μs	--	8.3	--	μC

**Notes**

- Limited by maximum junction temperature.
- Repetitive Rating: Pulse width limited by maximum junction temperature.
- L=6mH, I<sub>D</sub>=25A, R<sub>G</sub>=25Ω, V<sub>DD</sub>=150V, Start T<sub>J</sub>=25°C.
- I<sub>SD</sub> ≤25A, di/dt ≤100A/μs, V<sub>DD</sub> ≤BV<sub>DSS</sub>, Start T<sub>J</sub>=25°C.

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

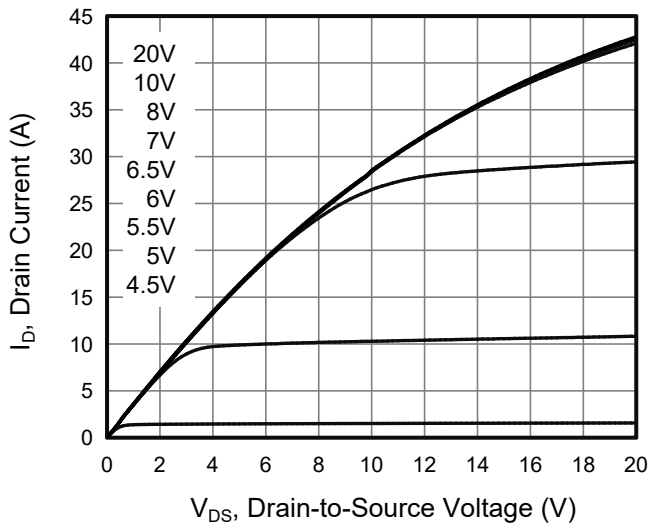


Figure 1. Output Characteristics

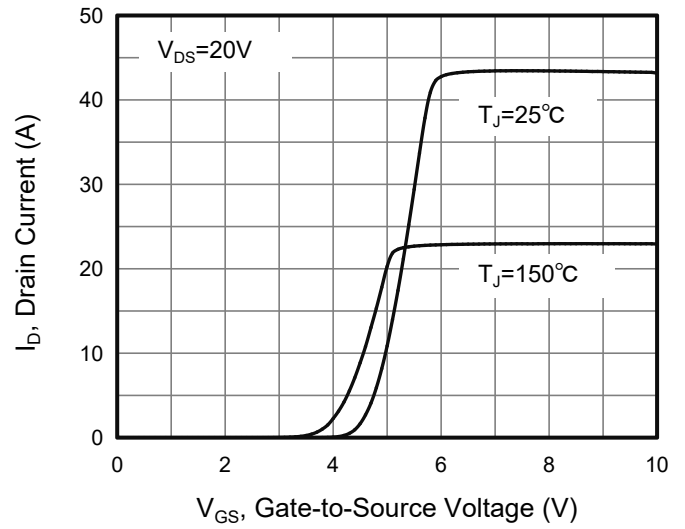


Figure 4. Transfer Characteristics

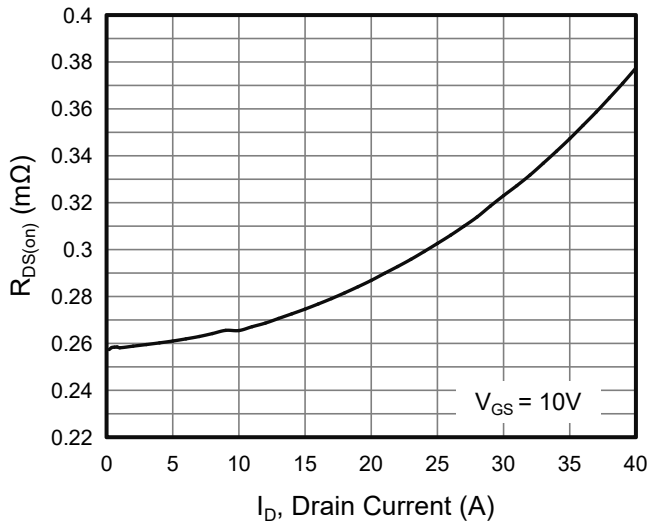


Figure 2. On-Resistance vs Drain Current

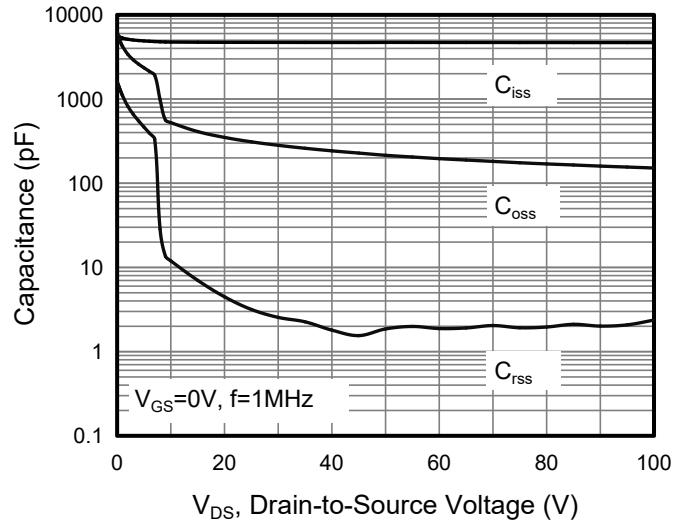


Figure 5. Capacitance

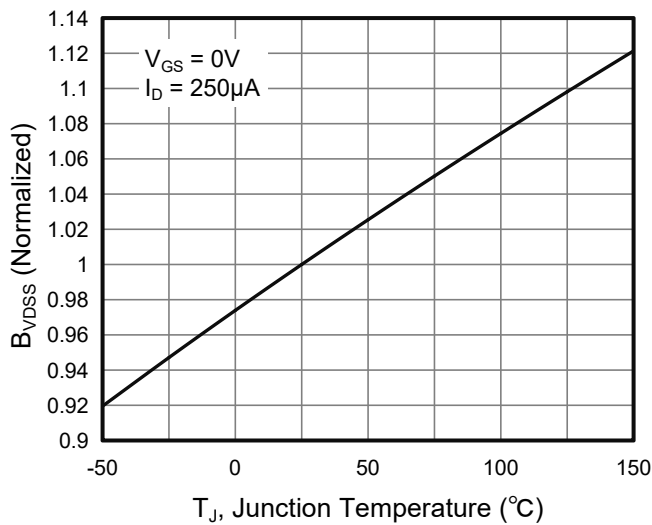


Figure 3. Breakdown Voltage vs Junction Temperature

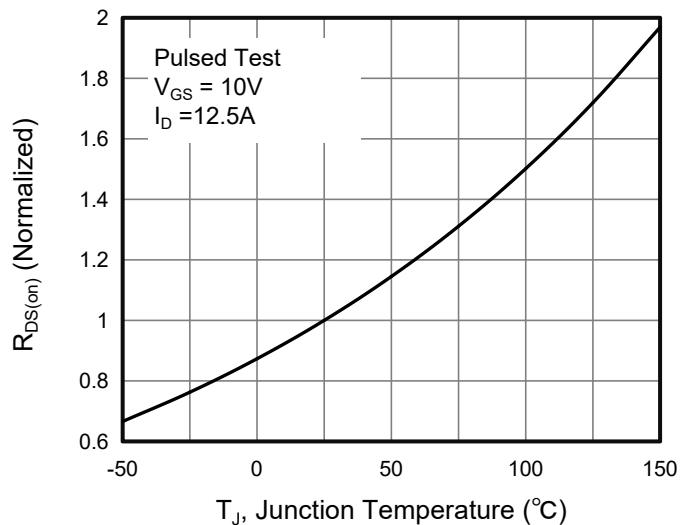


Figure 6. On-Resistance vs Temperature

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

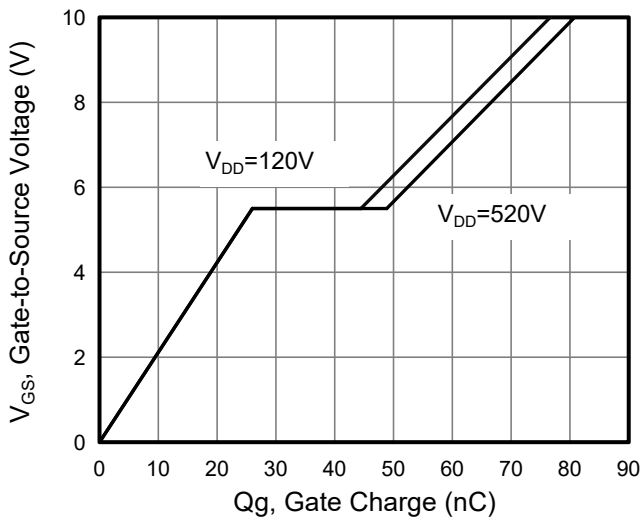


Figure 7. Gate Charge

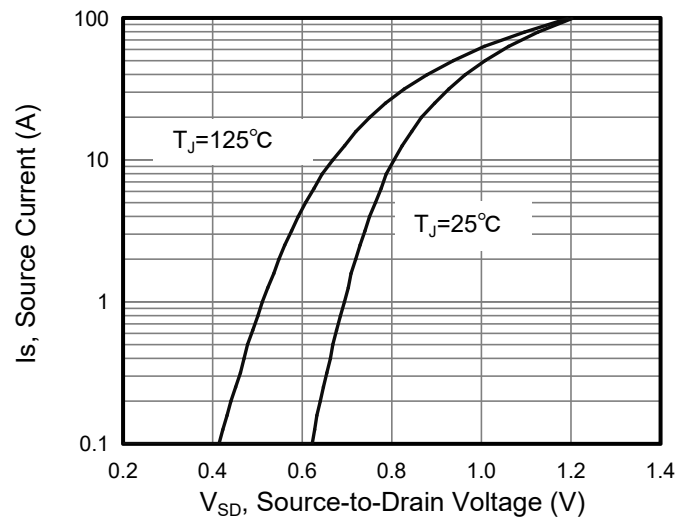


Figure 9. Body Diode Forward Voltage

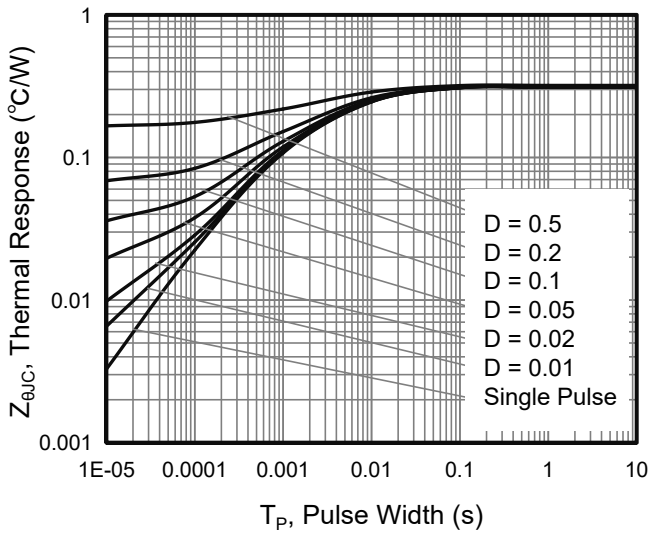


Figure 8. Transient Thermal Impedance

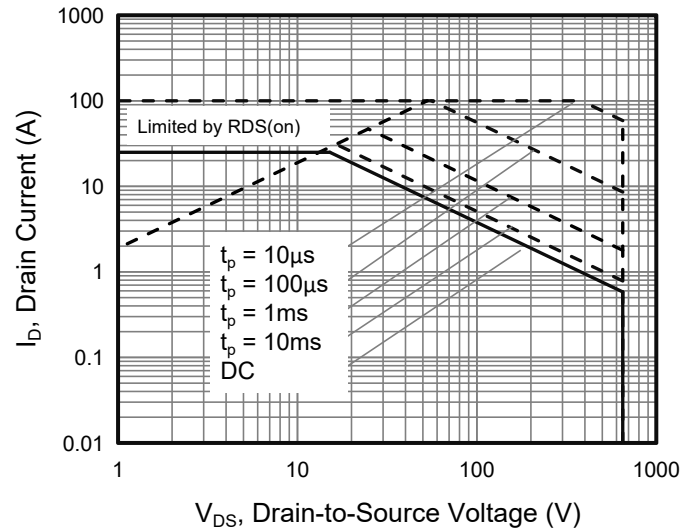


Figure 10. Safe Operation Area

Figure A: Gate Charge Test Circuit and Waveform

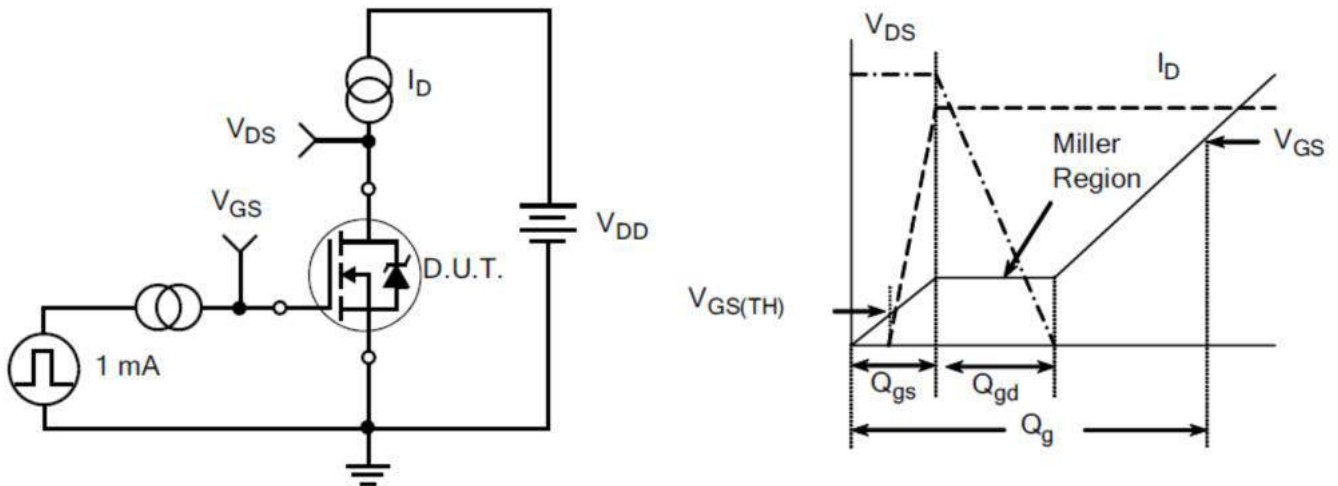


Figure B: Resistive Switching Test Circuit and Waveform

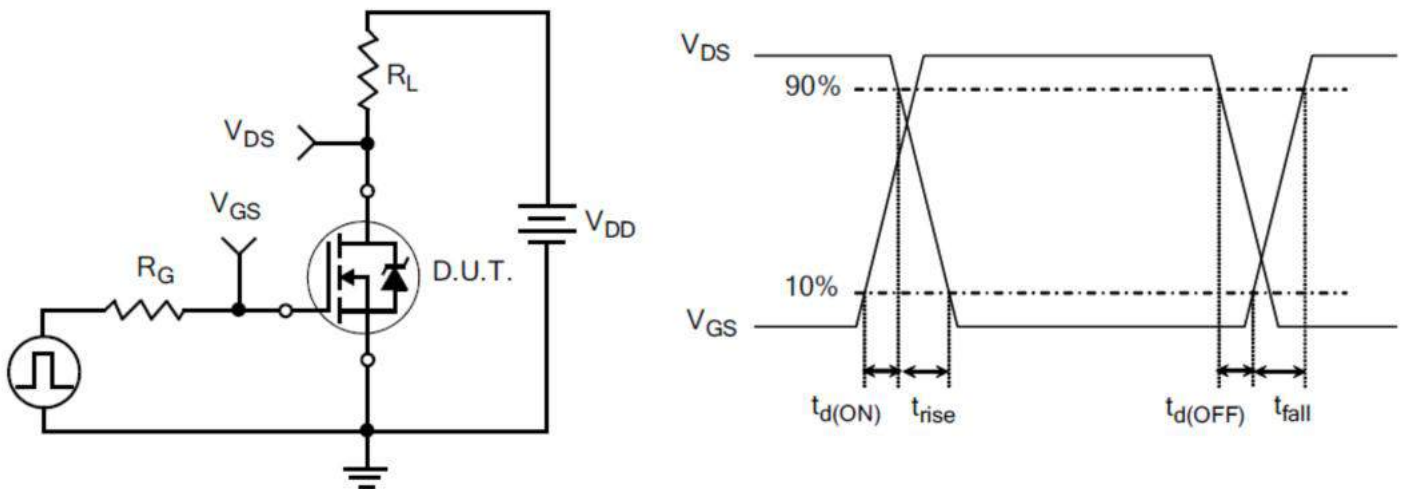
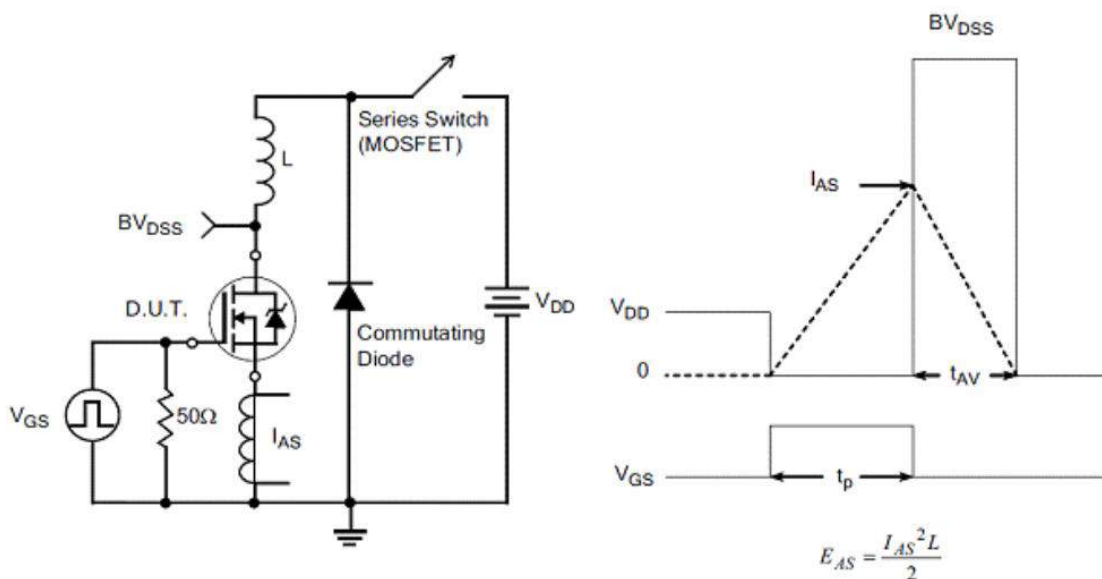
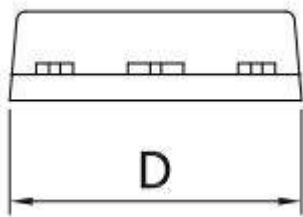
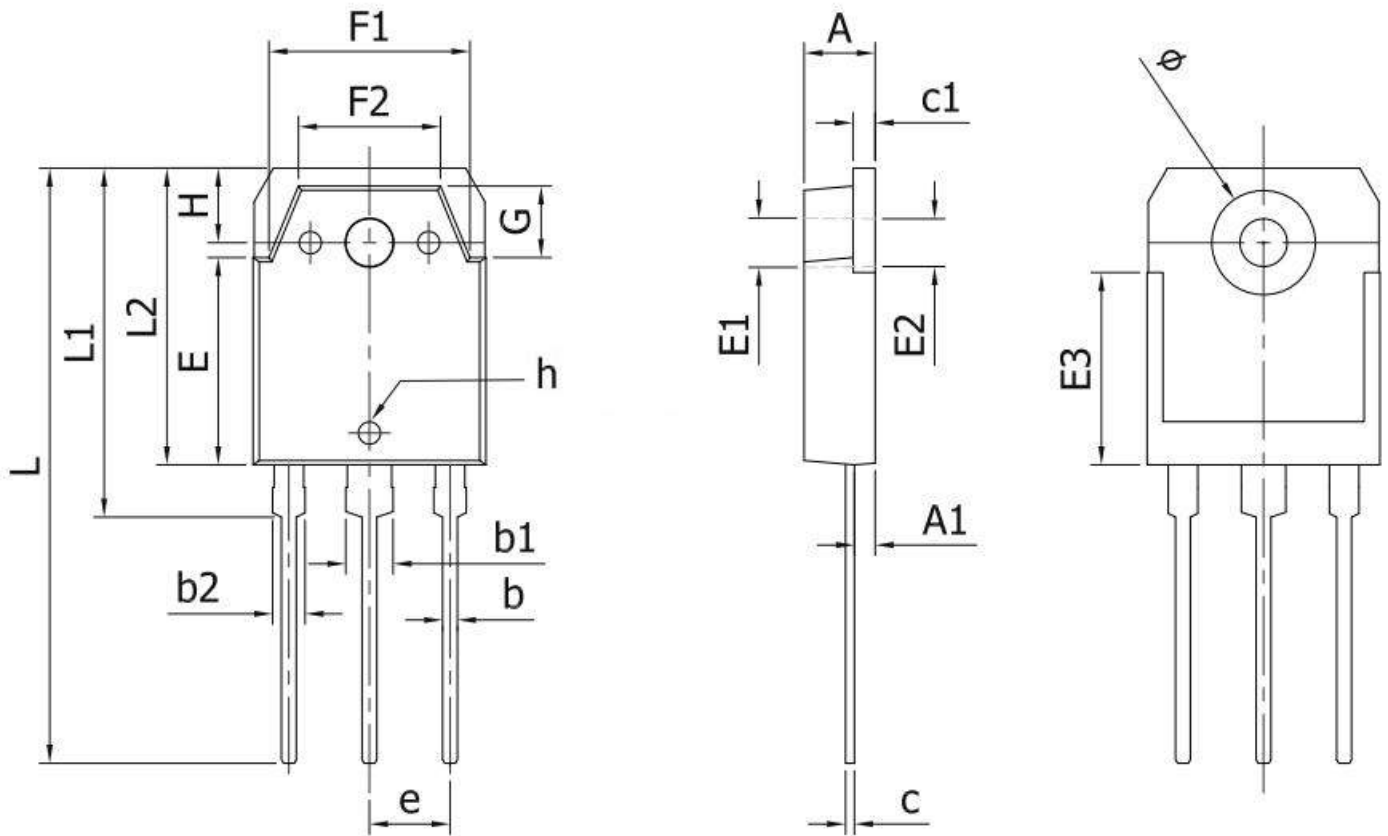


Figure C: Unclamped Inductive Switching Test Circuit and Waveform



## TO-3P Package Information



SYMBOL	MIN	NOM	MAX
A	4.6	4.8	5.0
A1	1.2	1.4	1.6
b	0.8	1	1.2
b1	2.8	3	3.2
b2	1.8	2	2.2
c	0.5	0.6	0.7
c1	1.45	1.55	1.65
D	15.45	15.65	15.85
E	13.7	13.9	14.1
E1	3.3REF		
E2	3.2REF		

SYMBOL	MIN	NOM	MAX
E3	12.9REF		
F1	13.4	13.6	13.8
F2	9.4	9.6	9.8
L	39.7	39.9	40.1
L1	23.2	23.4	23.6
L2	19.7	19.9	20.1
$\phi$	6.9	7	7.1
G	4.6	4.8	5.0
e	5.45TYP		
H	5.0REF		
h	0.0	0.15	0.3

## Customer Service

Sales and Service:

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