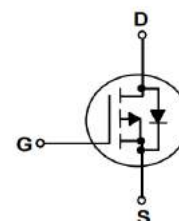


## Features

- P-Channel
- Fast Switching
- High Power and current handing capability
- Lead free product is acquired
- 100% EAS Tested

$V_{DS}$	-30	V
$R_{DS(on),TYP@ V_{GS}=-10V}$	3.1	m $\Omega$
$R_{DS(on),TYP@ V_{GS}=-4.5V}$	4.6	m $\Omega$
$I_D$	-126	A

### TO-252



Part ID	Package Type	Marking	Packing
ZT033P03D	TO-252	ZT033P03D	2500pcs/reel

### 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	$\pm 20$	V	
$V_{(BR)DSS}$	Drain-Source Breakdown Voltage	-30	V	
$T_J$	Maximum Junction Temperature	175	$^{\circ}\text{C}$	
$T_{STG}$	Storage Temperature Range	-55 to 175	$^{\circ}\text{C}$	
$I_{DM}$	Drain Current-Continuous@ Current-Pulsed (Note 1)	$T_C=25^{\circ}\text{C}$ -504	A	
<b>Mounted on Large Heat Sink</b>				
$I_D$	Drain Current-Continuous	$T_C=25^{\circ}\text{C}$	-126	A
		$T_C=100^{\circ}\text{C}$	-89	A
$P_D$	Maximum Power Dissipation	$T_C=25^{\circ}\text{C}$	107	W
		$T_C=100^{\circ}\text{C}$	53	W
$R_{\theta JC}$	Thermal Resistance-Junction to Case	1.4	$^{\circ}\text{C}/\text{W}$	
<b>Drain-Source Avalanche Ratings</b>				
EAS	Avalanche Energy, Single Pulsed (Note 2)	578	mJ	

**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	-30	--	--	V
IDSS	Zero Gate Voltage Drain Current	V <sub>DS</sub> =-30V, V <sub>GS</sub> =0V	--	--	-1	μA
IGSS	Gate-Body Leakage Current	V <sub>GS</sub> =±20V, 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	-1.0	-1.7	-2.5	V
RDS(on)	Drain-Source On-State Resistance	V <sub>GS</sub> =-10V, I <sub>D</sub> =-20A	--	3.1	3.9	mΩ
RDS(on)	Drain-Source On-State Resistance	V <sub>GS</sub> =-4.5V, I <sub>D</sub> =-20A	--	4.6	6.0	mΩ
gFS	Forward Transconductance	V <sub>DS</sub> =-5V, I <sub>D</sub> =-20A	--	60	--	S
<b>Dynamic Electrical Characteristics @ T<sub>J</sub> = 25°C (unless otherwise stated)</b>						
Ciss	Input Capacitance	V <sub>DS</sub> =-15V, V <sub>GS</sub> =0V, f=1MHz	--	6996	--	pF
Coss	Output Capacitance		--	4818	--	pF
Crss	Reverse Transfer Capacitance		--	539	--	pF
Rg	Gate Resistance f=1MHz	f=1MHz	--	2.2	--	Ω
Qg	Total Gate Charge	V <sub>DS</sub> =-15V, I <sub>D</sub> =-20A, V <sub>GS</sub> =-10V	--	128	--	nC
Qgs	Gate-Source Charge		--	12	--	nC
Qgd	Gate-Drain Charge		--	31	--	nC
<b>Switching Characteristics</b>						
Td(on)	Turn-on Delay Time	V <sub>DS</sub> =-15V, R <sub>L</sub> =0.75Ω, R <sub>G</sub> =3Ω, V <sub>GS</sub> =-10V	--	14	--	ns
Tr	Turn-on Rise Time		--	13	--	ns
Td(off)	Turn-Off Delay Time		--	65	--	ns
Tf	Turn-Off Fall Time		--	37	--	ns
<b>Source- Drain Diode Characteristics @ T<sub>J</sub> = 25°C (unless otherwise stated)</b>						
ISD	Source-Drain Current (Body Diode)		--	--	-126	A
VSD	Forward on voltage <sup>(Note 3)</sup>	I <sub>S</sub> =-20A, V <sub>GS</sub> =0V	--	--	1.2	V
Trr	Reverse Recovery Time	T <sub>J</sub> =25°C, I <sub>F</sub> =-20A, V <sub>GS</sub> =0V	--	30	--	ns
Qrr	Reverse Recovery Charge	di/dt=100A/μs	--	40	--	nC

Notes :

- 1.Repetitive Rating: Pulse width limited by maximum junction temperature.
- 2.EAS condition: T<sub>J</sub>=25°C, V<sub>DD</sub>=15V, V<sub>G</sub>=-10V, R<sub>G</sub>=25Ω, L=0.5mH.
- 3.Repetitive Rating: Pulse width limited by maximum junction temperature.

## Typical Electrical And Thermal Characteristics (Curves)

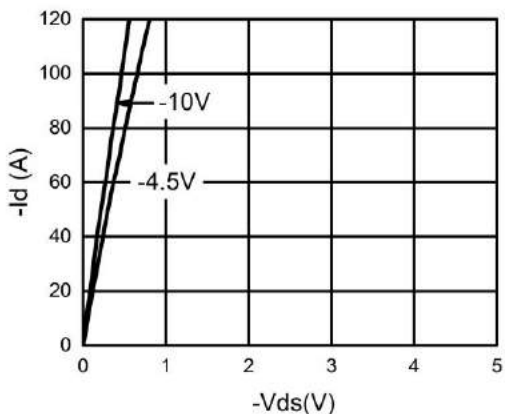


Figure 1. Output Characteristics

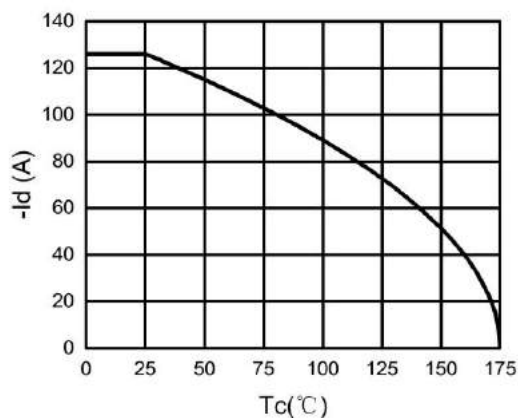


Figure 4. Drain Current

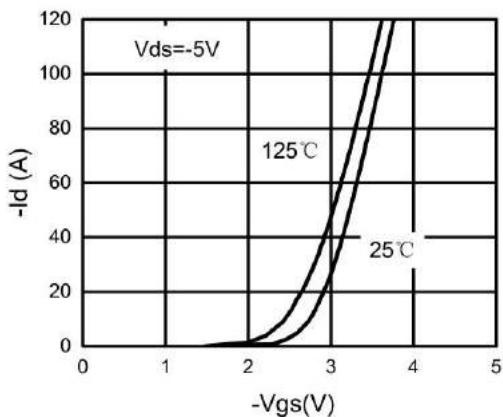


Figure 2. Transfer Characteristics

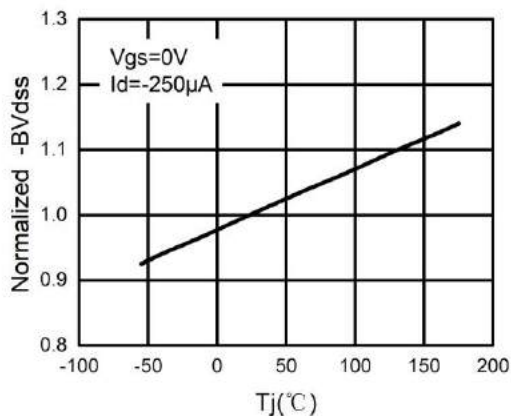


Figure 5.  $BV_{DSS}$  vs Junction Temperature

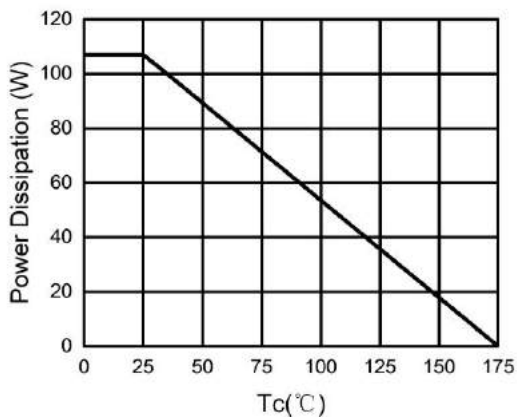


Figure 3. Power Dissipation

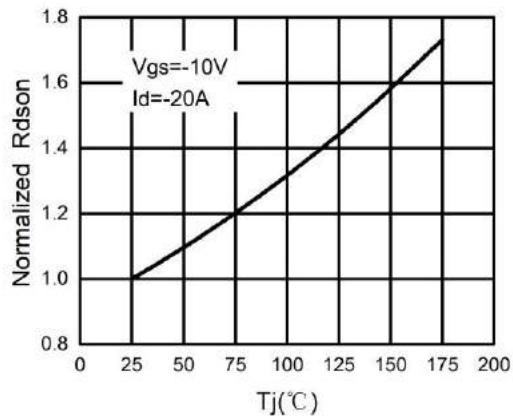


Figure 6.  $R_{DS(ON)}$  vs Junction Temperature

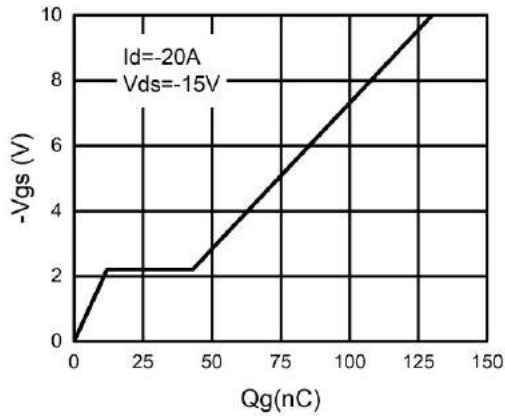


Figure 7. Gate Charge Waveforms

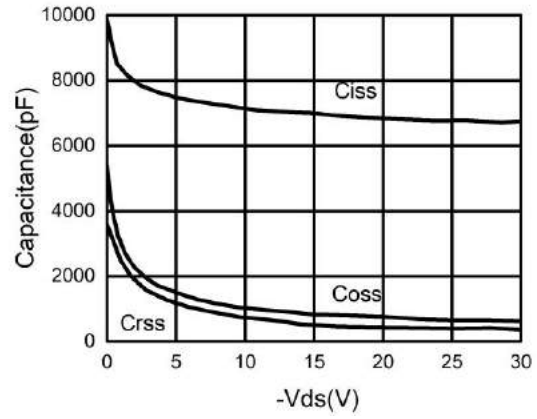


Figure 9. Capacitance

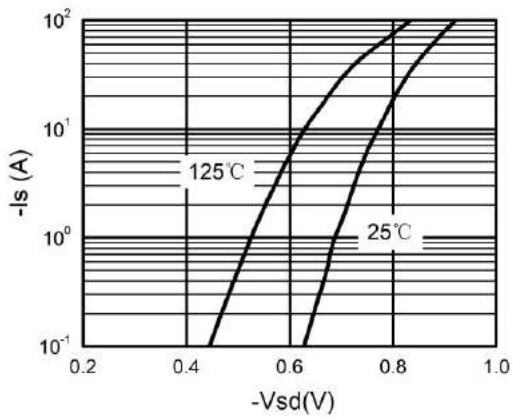


Figure 8. Body-Diode Characteristics

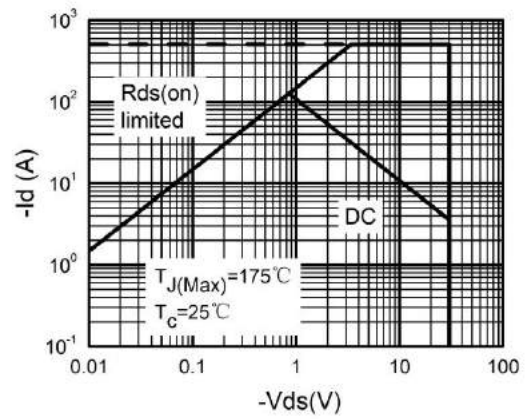
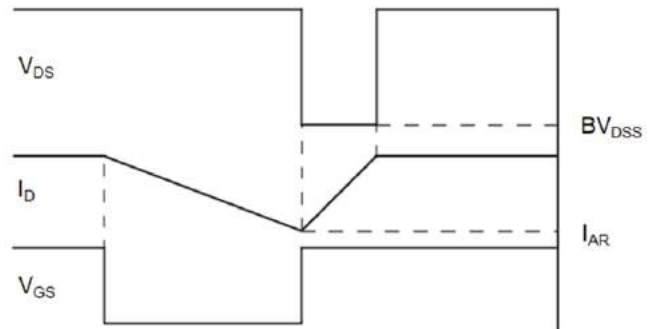
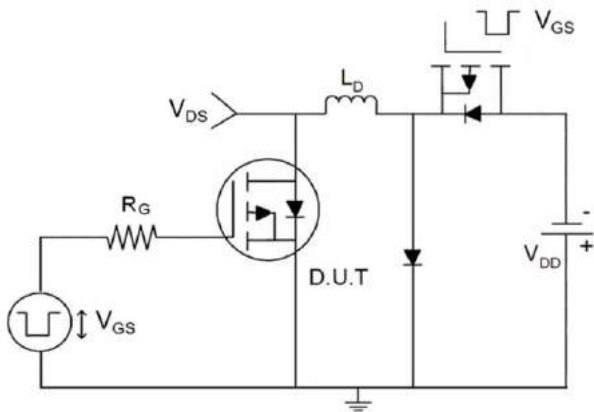


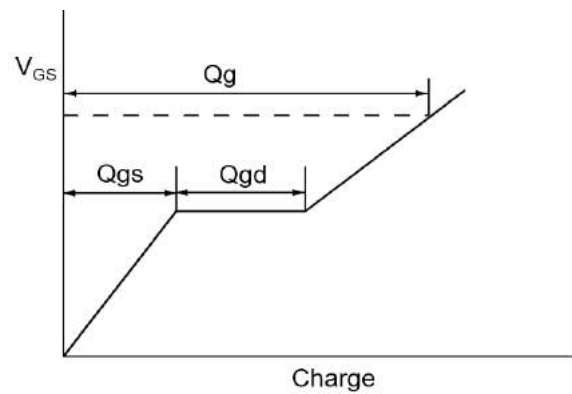
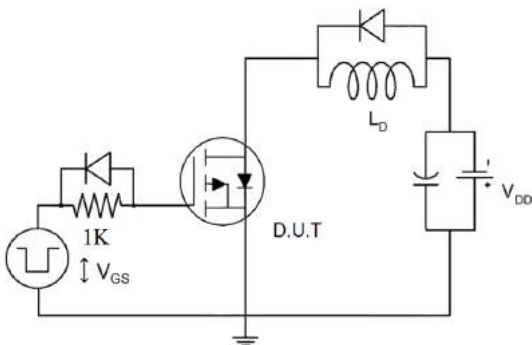
Figure 10. Maximum Safe Operating Area

## Test Circuit

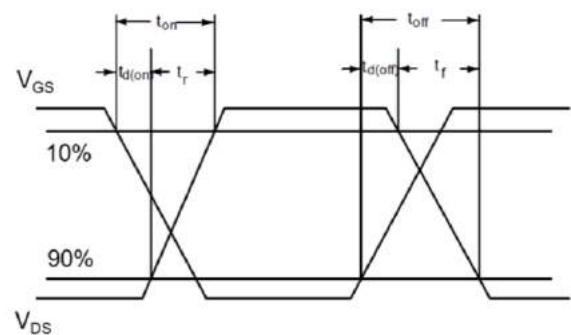
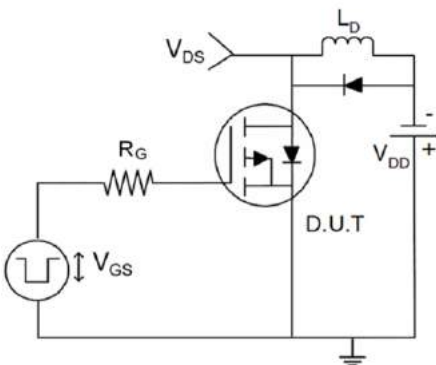
### 1) $E_{AS}$ Test Circuits



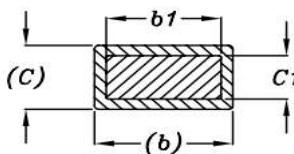
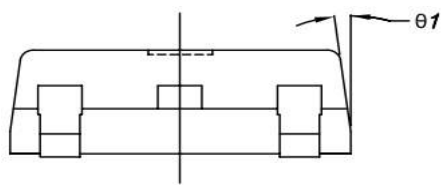
### 2) Gate Charge Test Circuit



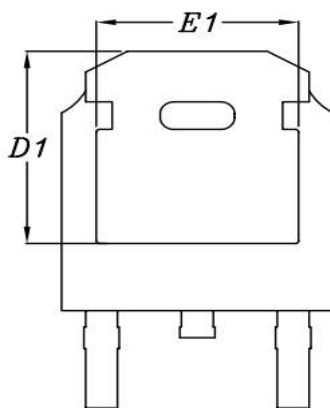
### 3) Switch Time Test Circuit



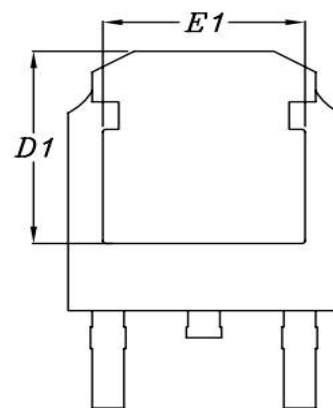
**TO-252 Package Information**



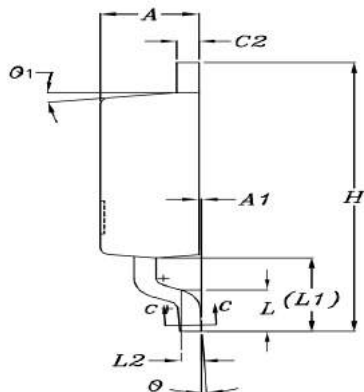
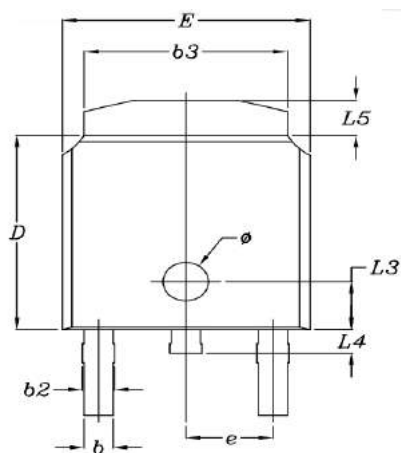
SECTION C-C



Option(1)  
Standard PAD



Option(2)  
Large PAD



I T E M	DIMENSIONS			
	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	2.18	2.39	0.086	0.094
A1	—	0.13	—	0.005
b	0.70	0.89	0.028	0.035
b1	0.70	0.86	0.028	0.034
b2	0.76	1.14	0.030	0.045
b3	4.95	5.46	0.195	0.215
c	0.46	0.61	0.018	0.024
c1	0.41	0.56	0.016	0.022
c2	0.46	0.89	0.018	0.035
D	5.97	6.22	0.235	0.245
D1	5.21	—	0.205	—
E	6.35	6.73	0.250	0.265
E1	4.32	—	0.170	—
e	2.29 BSC		0.090 BSC	
H	9.40	10.41	0.370	0.410
L	1.40	1.78	0.055	0.070
L1	2.60	2.90	0.102	0.114
L2	0.51 BSC		0.020 BSC	
L3	1.65	1.95	0.065	0.077
L4	0.60	0.90	0.024	0.035
L5	0.89	1.27	0.035	0.050
∅	1°	5°	1°	5°
∅1	7° REF		7° REF	
∅	1.20 REF		1.20 REF	

**Customer Service**

**Sales and Service:**

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