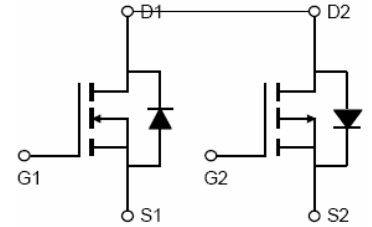
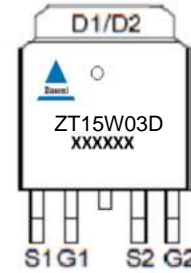


## Features

- N and P-Channel
- Trench Technology Power MOSFET
- Low Gate Charge and  $R_{DS(ON)}$
- Low Gate Resistance
- 100% EAS Tested

$V_{DS}$	30	-30	V
$R_{DS(on),TYP}@ V_{GS}=\pm 10V$	8	22	m $\Omega$
$R_{DS(on),TYP}@ V_{GS}=\pm 4.5V$	13	33	m $\Omega$
$I_D$	25	-16	A

TO-252-4L



Part ID	Package Type	Marking	Packing
ZT15W03D	TO-252-4L	ZT15W03D	2500pcs/Reel

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

Symbol	Parameter	N-Ch	P-Ch	Unit	
<b>Common Ratings (<math>T_C=25^\circ\text{C}</math> Unless Otherwise Noted)</b>					
$V_{GS}$	Gate-Source Voltage	$\pm 20$	$\pm 20$	V	
$V_{(BR)DSS}$	Drain-Source Breakdown Voltage	30	-30	V	
$T_J$	Maximum Junction Temperature	150	150	$^\circ\text{C}$	
$T_{STG}$	Storage Temperature Range	-55 to 150	-55 to 150	$^\circ\text{C}$	
$I_{DM}$	Drain Current-Continuous@ Current-Pulsed (Note 1)	$T_C = 25^\circ\text{C}$	76	-49	A
<b>Mounted on Large Heat Sink</b>					
$I_D$	Drain Current-Continuous	$T_C = 25^\circ\text{C}$	25	-16	A
		$T_C = 100^\circ\text{C}$	16	-12.5	A
$P_D$	Power Dissipation ( $T_C = 25^\circ\text{C}$ ) - Derate above $25^\circ\text{C}$	3.7	5.4	W	
$R_{\theta JC}$	Thermal Resistance-Junction to Case	45	24	$^\circ\text{C/W}$	
<b>Drain-Source Avalanche Ratings</b>					
EAS	Avalanche Energy, Single Pulsed (Note 2)	30	22	mJ	

**Electrical Characteristics ( $T_J=25^\circ\text{C}$  unless otherwise noted) N channel**

Symbol	Parameter	Condition	Min	Typ	Max	Unit
<b>Static Electrical Characteristics @ <math>T_J=25^\circ\text{C}</math> (unless otherwise stated)</b>						
$V_{(BR)DSS}$	Drain-Source Breakdown Voltage	$V_{GS}=0V, I_D=250\mu A$	30	--	--	V
$I_{DSS}$	Zero Gate Voltage Drain Current	$V_{DS}=24V, V_{GS}=0V$	--	--	1	$\mu A$
$I_{GSS}$	Gate-Body Leakage Current	$V_{GS}=\pm 20V, V_{DS}=0V$	--	--	$\pm 100$	nA
$V_{GS(th)}$	Gate Threshold Voltage	$V_{DS}=V_{GS}, I_D=250\mu A$	1.0	1.5	2.0	V
$R_{DS(on)}$	Drain-Source On-State Resistance	$V_{GS}=10V, I_D=15A$	--	8	13	m $\Omega$
$R_{DS(on)}$	Drain-Source On-State Resistance	$V_{GS}=4.5V, I_D=10A$	--	13	18	m $\Omega$
$g_{FS}$	Forward Transconductance	$V_{DS}=5V, I_D=30A$	10	--	--	S
<b>Dynamic Electrical Characteristics @ <math>T_J = 25^\circ\text{C}</math> (unless otherwise stated) (Note 3,4)</b>						
$C_{iss}$	Input Capacitance	$V_{DS}=15V, V_{GS}=0V,$ $f=1\text{MHz}$	--	592	--	pF
$C_{oss}$	Output Capacitance		--	130	--	pF
$C_{rss}$	Reverse Transfer Capacitance		--	91	--	pF
$R_g$	Gate Resistance	$f=1\text{MHz}$	--	4.2	--	$\Omega$
$Q_g$	Total Gate Charge	$V_{DS}=15V, I_D=15A,$ $V_{GS}=4.5V$	--	11	--	nC
$Q_{gs}$	Gate-Source Charge		--	4.5	--	nC
$Q_{gd}$	Gate-Drain Charge		--	3.6	--	nC
<b>Switching Characteristics (Note 3,4)</b>						
$T_d(on)$	Turn-on Delay Time	$V_{DD}=15V,$ $I_D=15A,$ $R_G=3.3\Omega,$ $V_{GS}=10V$	--	4	--	ns
$T_r$	Turn-on Rise Time		--	8	--	ns
$T_d(off)$	Turn-Off Delay Time		--	31	--	ns
$T_f$	Turn-Off Fall Time		--	4	--	ns
<b>Source- Drain Diode Characteristics @ <math>T_J = 25^\circ\text{C}</math> (unless otherwise stated)</b>						
$I_{SD}$	Source-Drain Current (Body Diode)	$V_G=V_D=0V$	--	--	25	A
$V_{SD}$	Forward on voltage	$I_S=1A, V_{GS}=0V$	--	--	1.0	V
$T_{rr}$	Reverse Recovery Time	$T_J=25^\circ\text{C}, I_F=30A,$	--	8.0	--	ns
$Q_{rr}$	Reverse Recovery Charge	$di/dt=100A/\mu s$	--	5.2	--	nC

**Notes:**

1. Repetitive Rating : Pulse width limited by maximum junction temperature
2.  $L = 0.5\text{ mH}, V_{DD} = 15V, V_{GS}=10V, R_G = 25\ \Omega$ , Starting  $T_J = 25^\circ\text{C}$
3.  $I_{SD} \leq I_{Max}, di/dt = 100A/\mu s, V_{DD} \leq BV_{DSS}$ , Starting  $T_J = 25^\circ\text{C}$
4. Pulse Test : Pulse width  $\leq 300\mu s$ , Duty cycle  $\leq 2\%$
5. Essentially independent of operating temperature

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

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	-32.5	--	V
I <sub>DSS</sub>	Zero Gate Voltage Drain Current	V <sub>DS</sub> =-24V, V <sub>GS</sub> =0V	--	--	-1	μA
I <sub>GSS</sub>	Gate-Body Leakage Current	V <sub>GS</sub> =±20V, 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	-1.1	-1.6	-2.2	V
R <sub>DS(on)</sub>	Drain-Source On-State Resistance	V <sub>GS</sub> =-10V, I <sub>D</sub> =-6A	--	22	28	mΩ
R <sub>DS(on)</sub>	Drain-Source On-State Resistance	V <sub>GS</sub> =-4.5V, I <sub>D</sub> =-4A	--	33	39	mΩ
g <sub>FS</sub>	Forward Transconductance (Note 3)	V <sub>DS</sub> =-5V, I <sub>D</sub> =-6A	--	17	--	S
<b>Dynamic Electrical Characteristics @ T<sub>J</sub> = 25°C (unless otherwise stated)</b> (Note 3,4)						
C <sub>iss</sub>	Input Capacitance	V <sub>DS</sub> =-15V, V <sub>GS</sub> =0V, f=1MHz	--	933	--	pF
C <sub>oss</sub>	Output Capacitance		--	126	--	pF
C <sub>rss</sub>	Reverse Transfer Capacitance		--	103	--	pF
R <sub>g</sub>	Gate Resistance	f=1MHz	--	7.3	--	Ω
Q <sub>g</sub>	Total Gate Charge	V <sub>DS</sub> =-15V, I <sub>D</sub> =-6A, V <sub>GS</sub> =-4.5V	--	14	--	nC
Q <sub>gs</sub>	Gate-Source Charge		--	3.3	--	nC
Q <sub>gd</sub>	Gate-Drain Charge		--	3.2	--	nC
<b>Switching Characteristics</b> (Note 3,4)						
T <sub>d(on)</sub>	Turn-on Delay Time	V <sub>DD</sub> =-15V, I <sub>D</sub> =-6A, R <sub>G</sub> =3.3Ω, V <sub>GS</sub> =-10V	--	7.2	--	ns
T <sub>r</sub>	Turn-on Rise Time		--	3.8	--	ns
T <sub>d(off)</sub>	Turn-Off Delay Time		--	2.6	--	ns
T <sub>f</sub>	Turn-Off Fall Time		--	3.2	--	ns
<b>Source- Drain Diode Characteristics @ T<sub>J</sub> = 25°C (unless otherwise stated)</b>						
I <sub>SD</sub>	Source-Drain Current (Body Diode)		--	--	-16	A
V <sub>SD</sub>	Forward on voltage	I <sub>S</sub> = -1A, 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> = -6A,	--	25	--	nS
Q <sub>rr</sub>	Reverse Recovery Charge	di/dt=100A/μs	--	22	--	nC

**Notes:**

1. Repetitive Rating : Pulse width limited by maximum junction temperature
2. L = 0.5 mH, V<sub>DD</sub> = -15V, R<sub>G</sub> = 25 Ω, Starting T<sub>J</sub> = 25°C
3. I<sub>SD</sub> ≤ -12A, di/dt = 100A/μs, V<sub>DD</sub> ≤ BV<sub>DSS</sub>, Starting T<sub>J</sub> = 25°C
4. Pulse Test : Pulse width ≤ 300μs, Duty cycle ≤ 2%
5. Essentially independent of operating temperature

### Typical Performance Characteristics - N channel

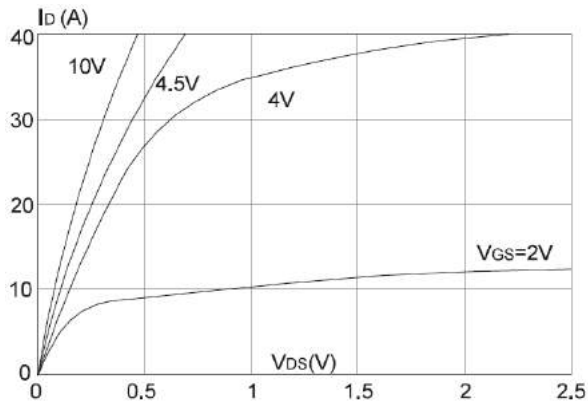


Fig.1 Output Characteristics

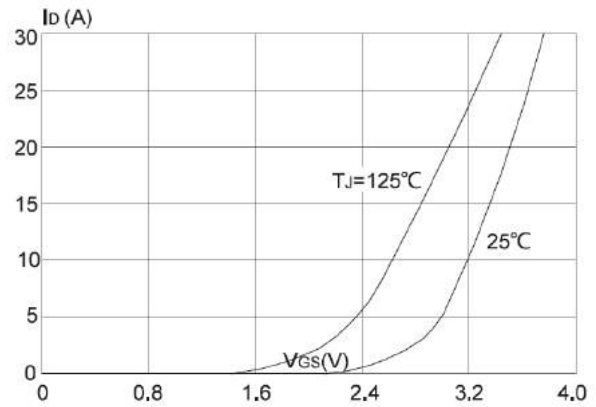


Fig.4 Typical Transfer Characteristics

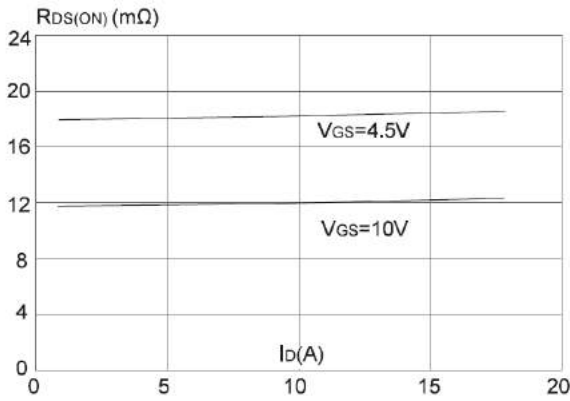


Fig.2 On-resistance vs. Drain Current

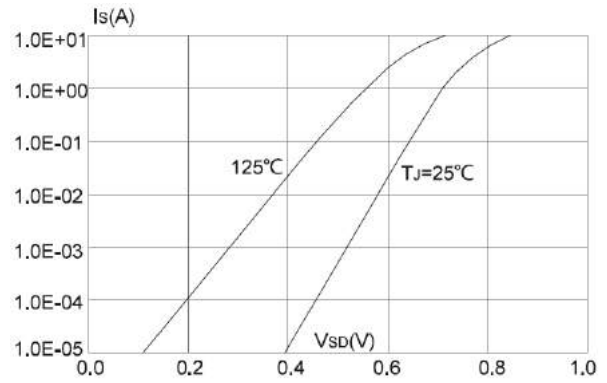


Fig. 5 Body Diode Characteristics

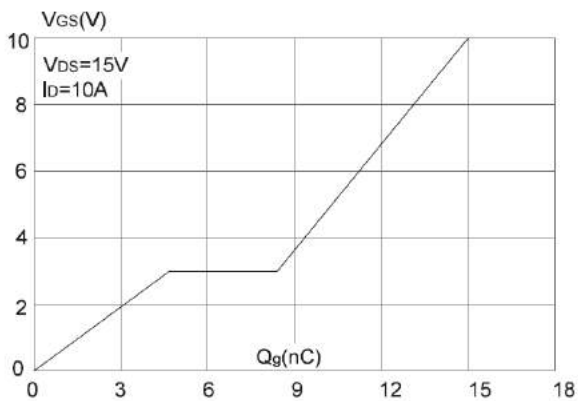


Fig.3 Gate Charge Characteristics

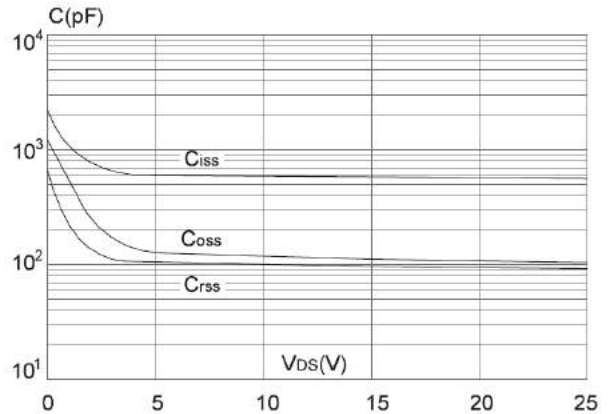


Fig. 6 Capacitance Characteristics

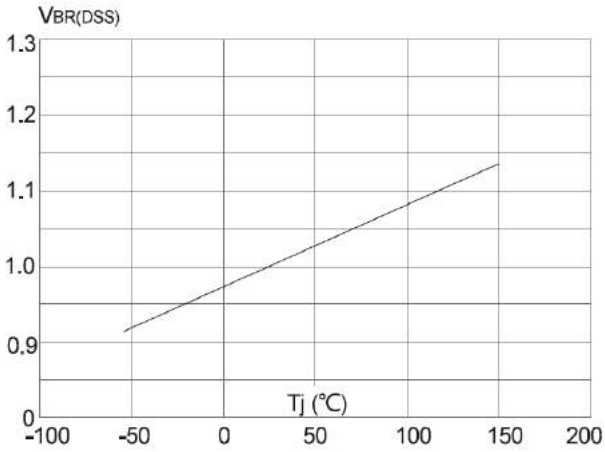


Fig.7 Normalized Breakdown Voltage vs. Junction Temperature

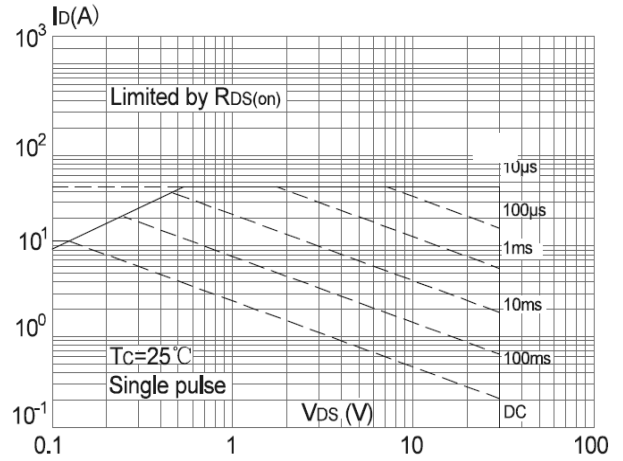


Fig.9 Safe Operating Area

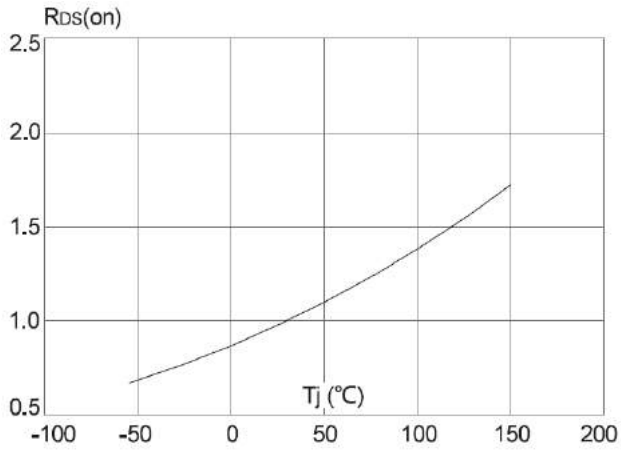


Fig. 8 Normalized on Resistance vs. Junction Temperature

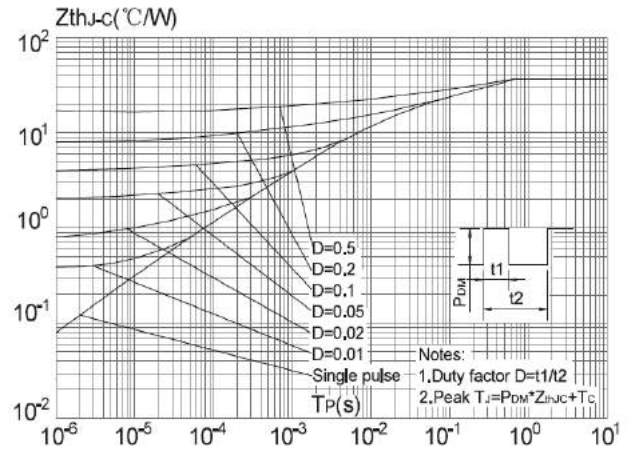
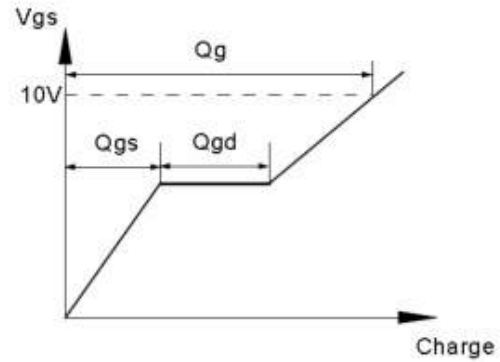
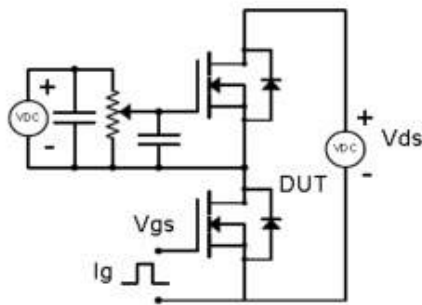


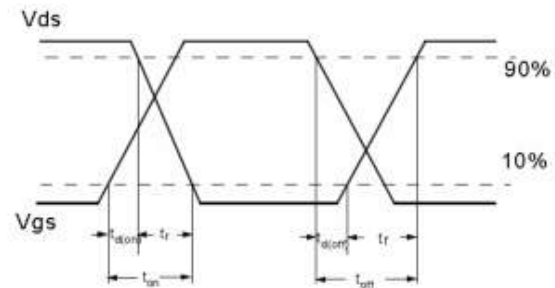
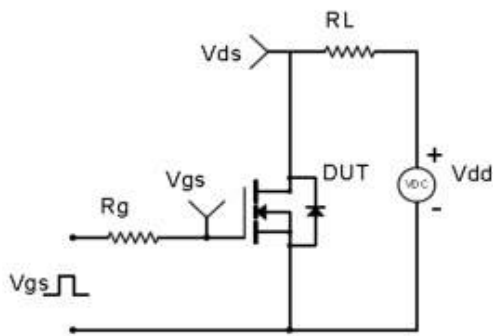
Fig. 10 Transient Thermal Response Curve

## Test Circuit & Waveform

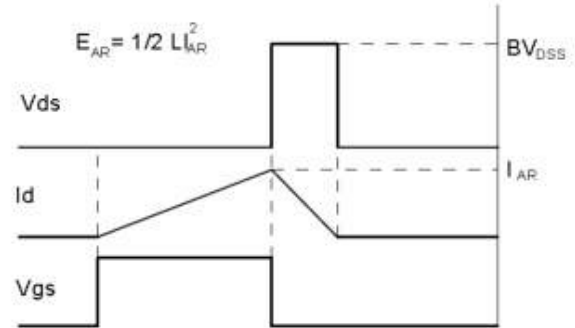
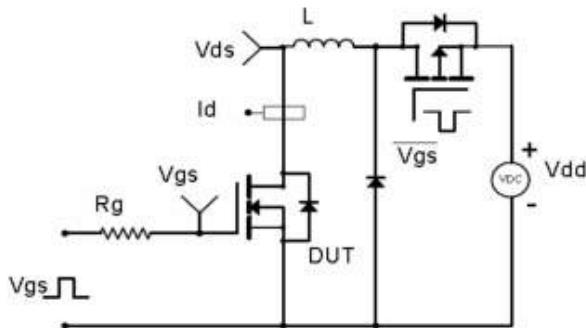
Gate Charge Test Circuit & Waveform



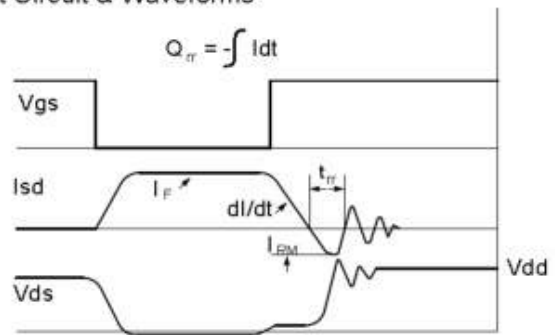
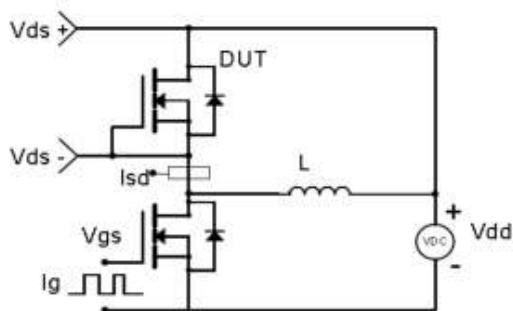
Resistive Switching Test Circuit & Waveforms



Unclamped Inductive Switching (UIS) Test Circuit & Waveforms



Diode Recovery Test Circuit & Waveforms



### Typical Performance Characteristics - P channel

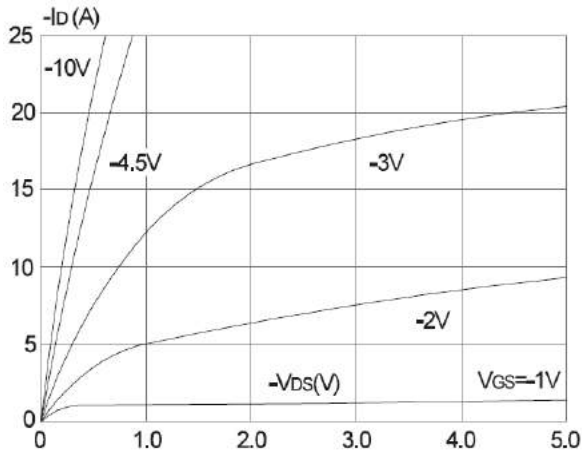


Fig.1 Output Characteristics

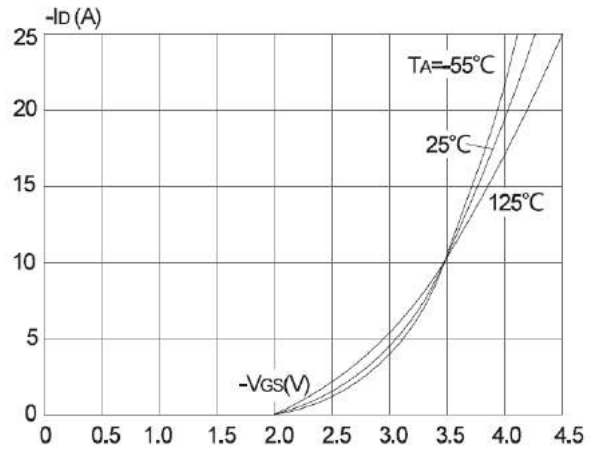


Fig.4 Typical Transfer Characteristics

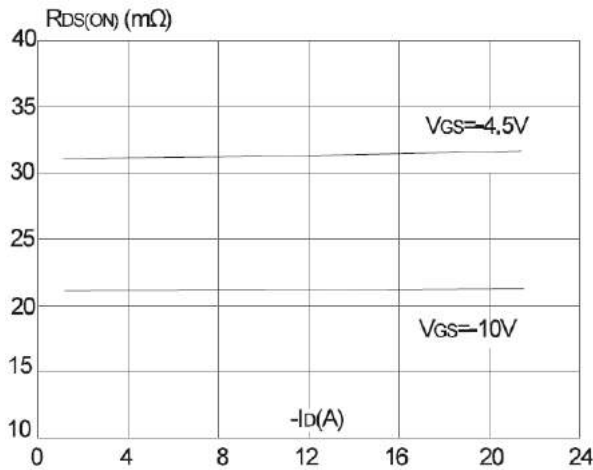


Fig.2 On-resistance vs. Drain Current

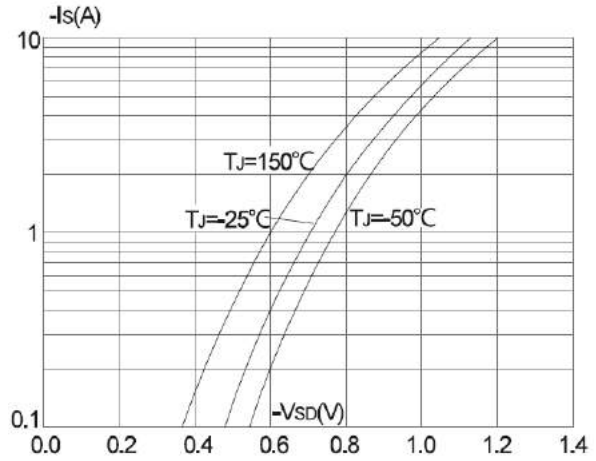


Fig. 5 Body Diode Characteristics

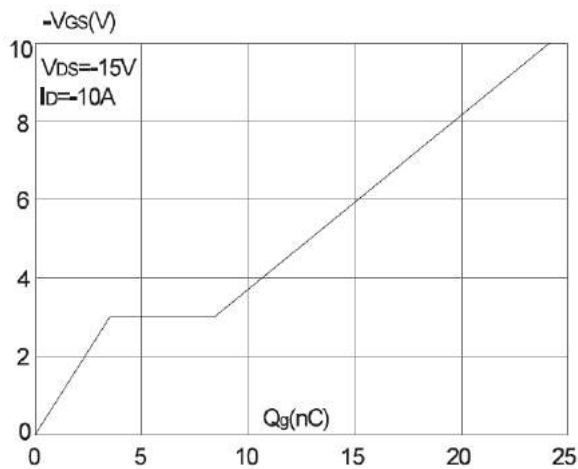


Fig.3 Gate Charge Characteristics

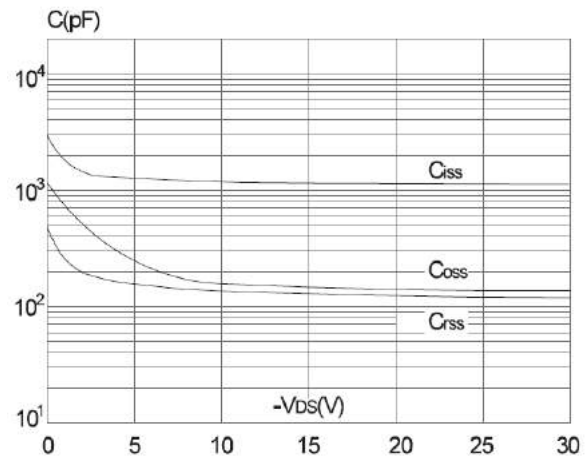


Fig. 6 Capacitance Characteristics

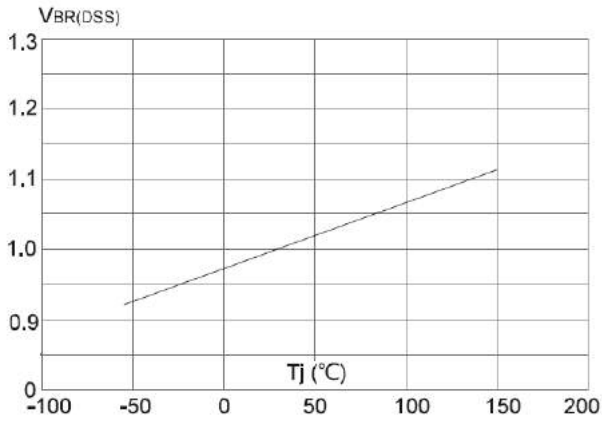


Fig.7 Normalized Breakdown Voltage vs. Junction Temperature

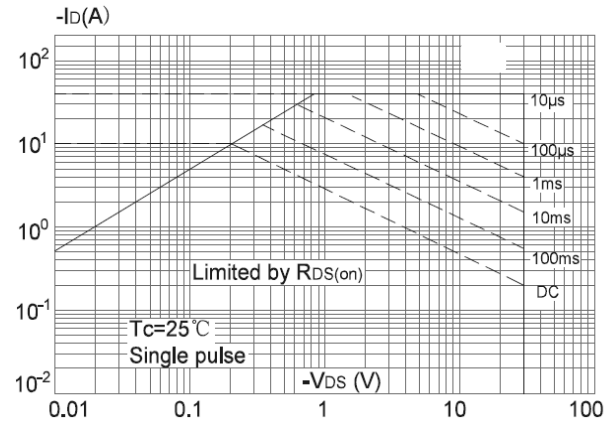


Fig.9 Safe Operating Area

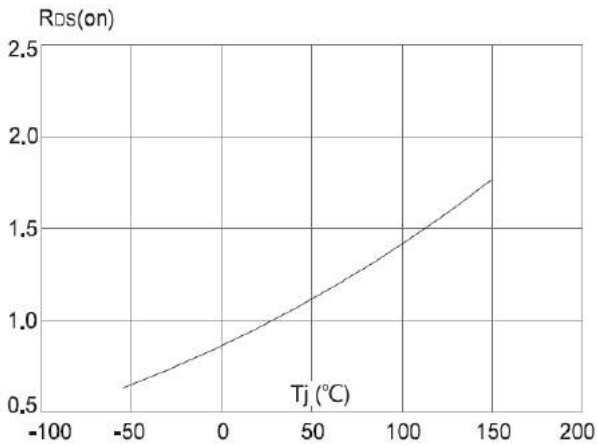


Fig.8 Normalized on Resistance vs. Junction Temperature

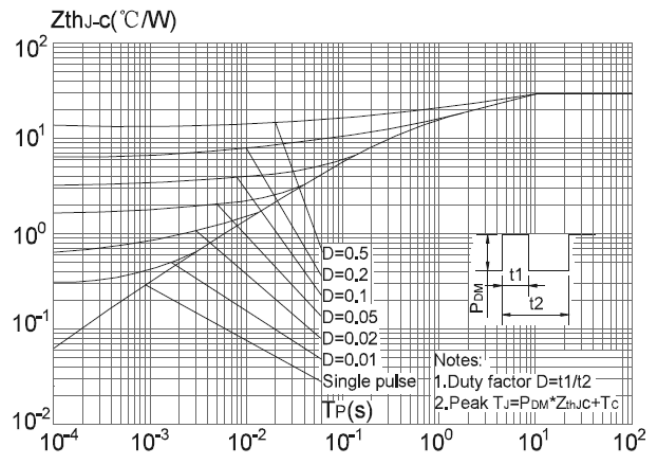
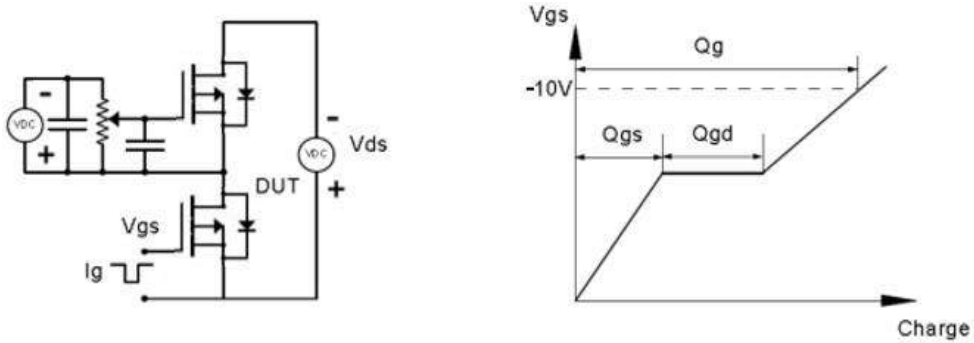


Fig.10 Transient Thermal Response Curve

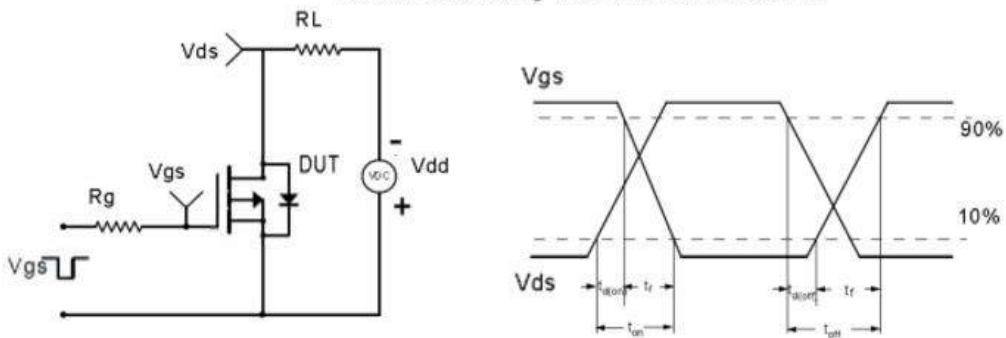


### Test Circuit & Waveform

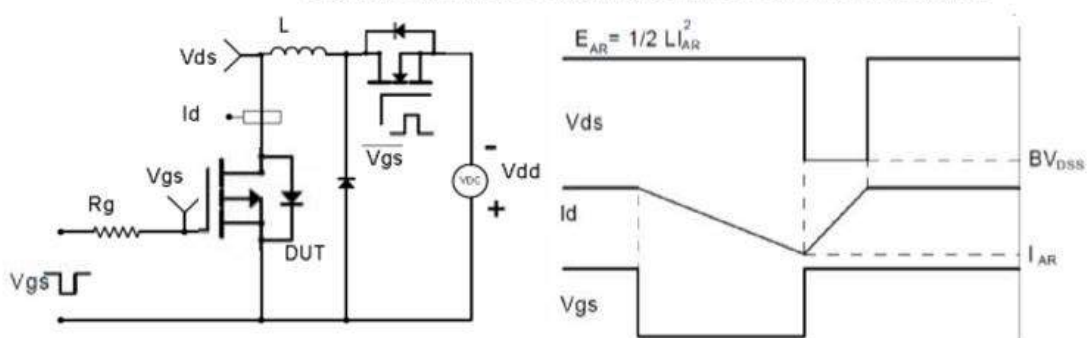
Gate Charge Test Circuit & Waveform



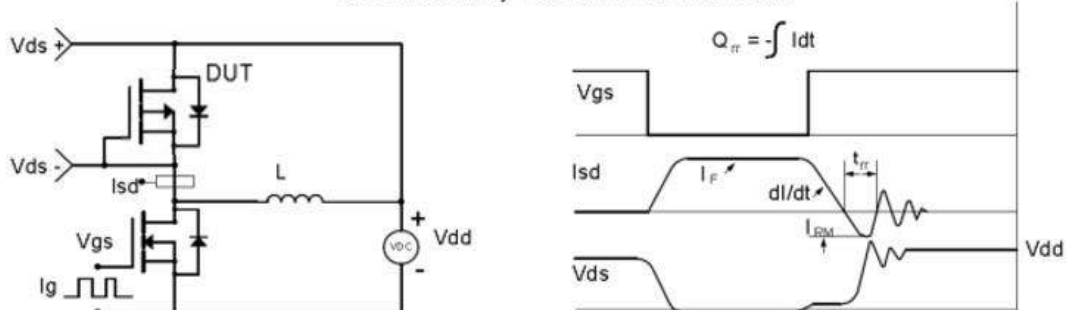
Resistive Switching Test Circuit & Waveforms



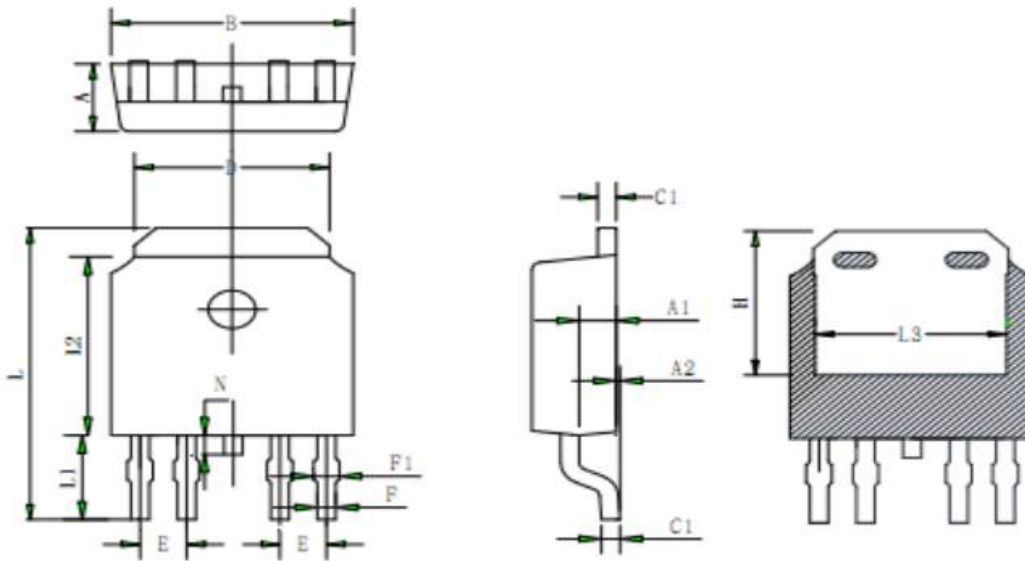
Unclamped Inductive Switching (UIS) Test Circuit & Waveforms



Diode Recovery Test Circuit & Waveforms



## TO-252-4L Package Information



Symbol	Min	Typ	Max
A	2.20	2.30	2.40
A1	0.91	1.01	1.11
A2	0.05	0.15	0.25
B	6.45	6.60	6.75
C	0.45	0.50	0.58
C1	0.45	0.50	0.58
D	5.12	5.32	5.52
E	1.27 TYP		
F1	0.45	0.60	0.75
F	0.40	0.50	0.60
H	4.70	4.90	5.10
L	9.70	10.00	10.20
L1	2.6	2.8	3.0
L2	5.95	6.10	6.25
L3	5.00	5.20	5.40 <sup>*</sup>
N	0.45	0.65	0.85

## Customer Service

**Sales and Service:**

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