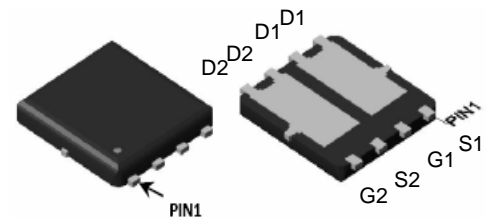


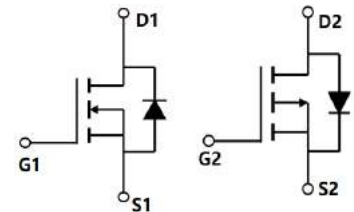
Features

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

V_{DS}	30	V
$R_{DS(on),TYP@ V_{GS}=10V}$	9	$m\Omega$
$R_{DS(on),TYP@ V_{GS}=4.5V}$	13	$m\Omega$
I_D	19	A



Part ID	Package Type	Marking	Packing
ZT12W03Q	DFN3x3	ZT12W03Q	5000pcs/Reel



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

Symbol	Parameter	N-Ch	P-Ch	Unit	
Common Ratings ($T_C = 25^\circ\text{C}$ Unless Otherwise Noted)					
V_{GS}	Gate-Source Voltage	± 20	± 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	-80	A
Mounted on Large Heat Sink					
I_D	Drain Current-Continuous	$T_C = 25^\circ\text{C}$	19	-20	A
		$T_C = 100^\circ\text{C}$	15	-16	A
P_D	Power Dissipation ($T_C = 25^\circ\text{C}$) - Derate above 25°C	3.7	5.8	W	
$R_{\theta JC}$	Thermal Resistance-Junction to Case	45	24	$^\circ\text{C/W}$	
Drain-Source Avalanche Ratings					
EAS	Avalanche Energy, Single Pulsed (Note 2)	30	42	mJ	

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

Symbol	Parameter	Condition	Min	Typ	Max	Unit
Static Electrical Characteristics @ $T_J=25^\circ\text{C}$ (unless otherwise stated)						
$V_{(BR)DSS}$	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	μA
I_{GSS}	Gate-Body Leakage Current	$V_{GS}=\pm 20V, V_{DS}=0V$	--	--	± 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	$V_{GS}=10V, I_D=15A$	--	9	13	m Ω
$R_{DS(on)}$	Drain-Source On-State Resistance	$V_{GS}=4.5V, I_D=10A$	--	13	18	m Ω
g_{FS}	Forward Transconductance	$V_{DS}=5V, I_D=30A$	10	--	--	S
Dynamic Electrical Characteristics @ $T_J = 25^\circ\text{C}$ (unless otherwise stated) (Note 3,4)						
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	$f=1\text{MHz}$	--	1.8	--	Ω
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
Switching Characteristics (Note 3,4)						
$T_d(on)$	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
Source- Drain Diode Characteristics @ $T_J = 25^\circ\text{C}$ (unless otherwise stated)						
I_{SD}	Source-Drain Current (Body Diode)	$V_G=V_D=0V$	--	--	19	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_J=25°C unless otherwise noted) P channel

Symbol	Parameter	Condition	Min	Typ	Max	Unit
Static Electrical Characteristics @ T_J=25°C (unless otherwise stated)						
V(BR)DSS	Drain-Source Breakdown Voltage	V _{GS} =0V, I _D =-250μA	-30	--	--	V
I _{DSS}	Zero Gate Voltage Drain Current	V _{DS} =-30V, V _{GS} =0V	--	--	-1	μA
I _{GSS}	Gate-Body Leakage Current	V _{GS} =±20V, V _{DS} =0V	--	--	±100	nA
V _{GS(th)}	Gate Threshold Voltage	V _{DS} =V _{GS} , I _D =-250μA	-1.1	-1.6	-2.2	V
R _{DS(on)}	Drain-Source On-State Resistance	V _{GS} =-10V, I _D =-10A	--	15	22	mΩ
R _{DS(on)}	Drain-Source On-State Resistance	V _{GS} =-4.5V, I _D =-8A	--	22	34	mΩ
g _{FS}	Forward Transconductance (Note 3)	V _{DS} =-5V, I _D =-10A	--	20	--	S
Dynamic Electrical Characteristics @ T_J = 25°C (unless otherwise stated) (Note 3,4)						
C _{iss}	Input Capacitance	V _{DS} =-15V, V _{GS} =0V, f=1MHz	--	1790	--	pF
C _{oss}	Output Capacitance		--	226	--	pF
C _{rss}	Reverse Transfer Capacitance		--	156	--	pF
Q _g	Total Gate Charge	V _{DS} =-15V, I _D =-10A, V _{GS} =-10V	--	53	--	nC
Q _{gs}	Gate-Source Charge		--	9	--	nC
Q _{gd}	Gate-Drain Charge		--	8.2	--	nC
Switching Characteristics (Note 3,4)						
T _{d(on)}	Turn-on Delay Time	V _{DD} =-15V, I _D =-10A, R _G =1Ω, V _{GS} =-10V	--	11	--	ns
T _r	Turn-on Rise Time		--	13	--	ns
T _{d(off)}	Turn-Off Delay Time		--	193	--	ns
T _f	Turn-Off Fall Time		--	94	--	ns
Source- Drain Diode Characteristics @ T_J = 25°C (unless otherwise stated)						
I _{SD}	Source-Drain Current (Body Diode)		--	--	-18	A
V _{SD}	Forward on voltage	I _S =-10A, V _{GS} =0V	--	--	-1.2	V
T _{rr}	Reverse Recovery Time	T _J =25°C, I _F =-10A,	--	35	--	nS
Q _{rr}	Reverse Recovery Charge	di/dt=100A/μs	--	34	--	nC

Notes:

1. Repetitive Rating : Pulse width limited by maximum junction temperature
2. L = 0.5 mH, V_{DD} = -15V, R_G = 25 Ω, Starting T_J = 25°C
3. I_{SD} ≤ -15A, di/dt = 100A/us, V_{DD} ≤ BV_{DSS}, Starting T_J = 25°C
4. Pulse Test : Pulse width ≤ 300us, Duty cycle ≤ 2%
5. Essentially independent of operating temperature

Typical Performance Characteristics - N channel

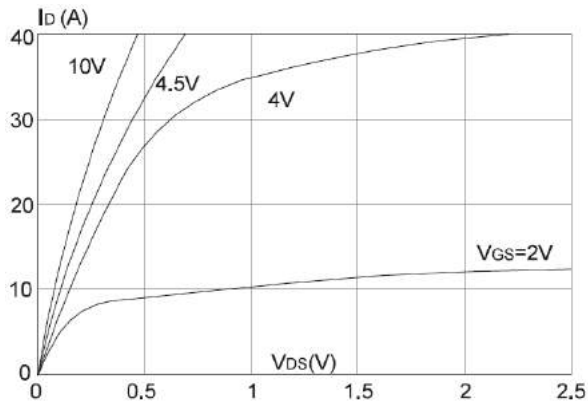


Fig.1 Output Characteristics

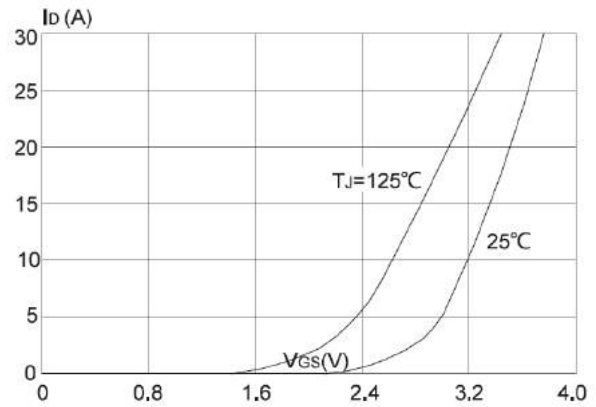


Fig.4 Typical Transfer Characteristics

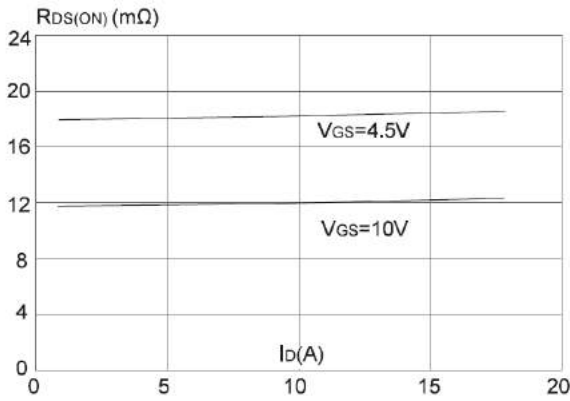


Fig.2 On-resistance vs. Drain Current

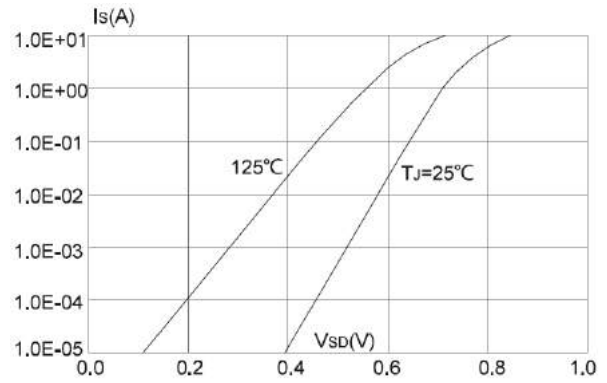


Fig. 5 Body Diode Characteristics

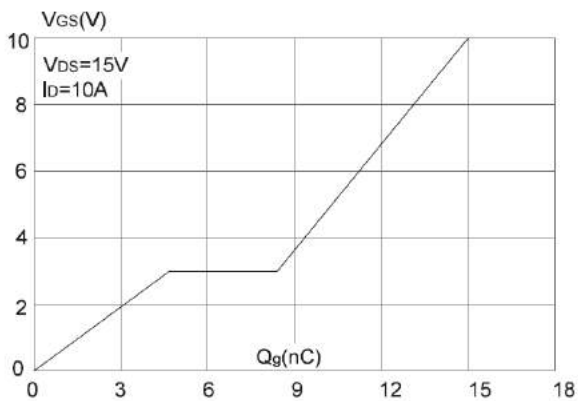


Fig.3 Gate Charge Characteristics

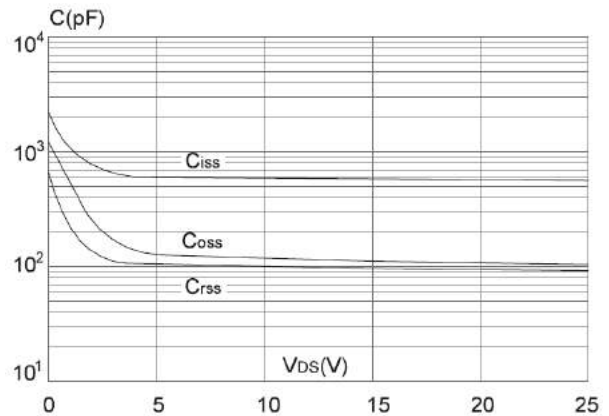


Fig. 6 Capacitance Characteristics

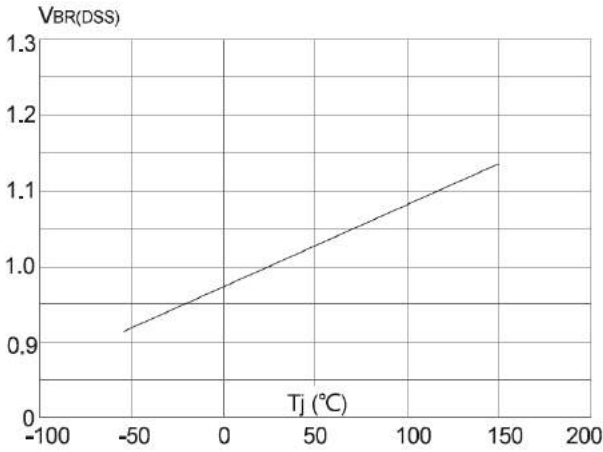


Fig.7 Normalized Breakdown Voltage vs. Junction Temperature

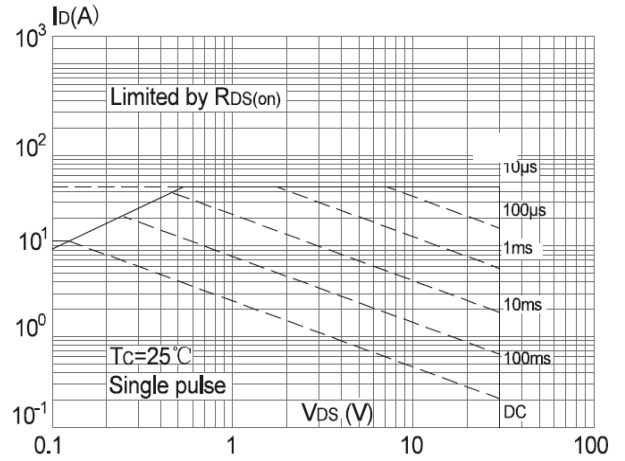


Fig.9 Safe Operating Area

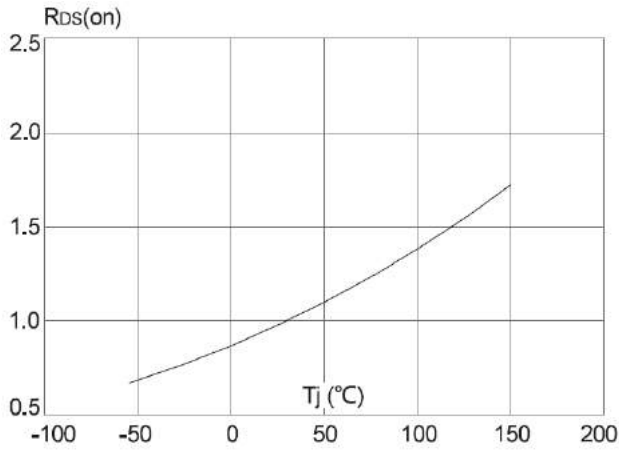


Fig. 8 Normalized on Resistance vs. Junction Temperature

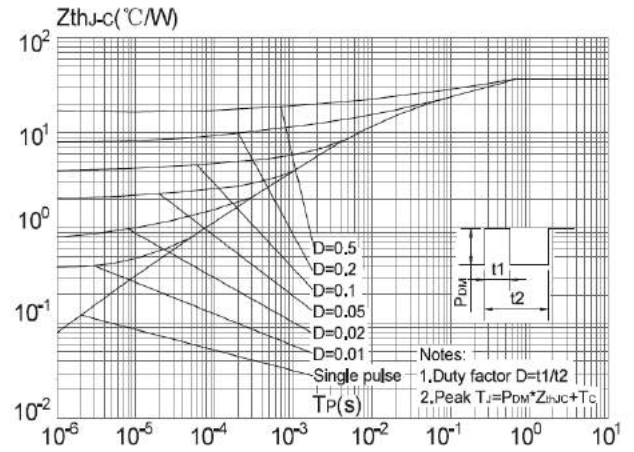
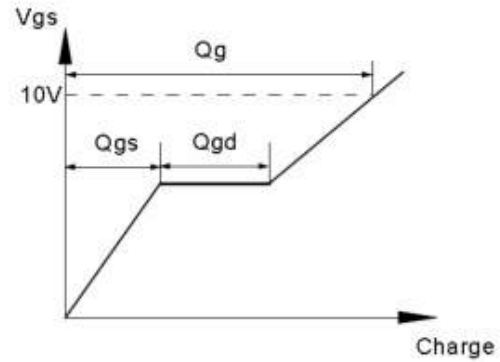
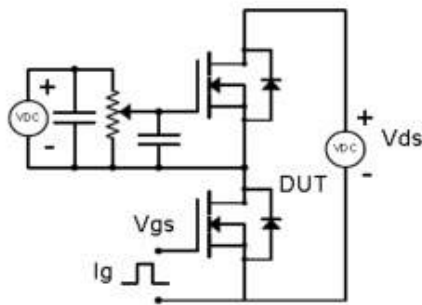


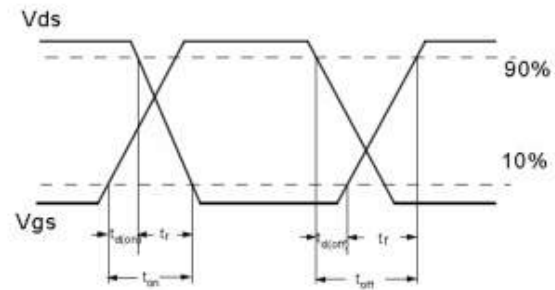
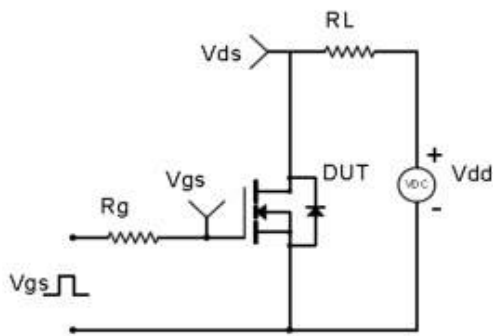
Fig. 10 Transient Thermal Response Curve

Test Circuit & Waveform

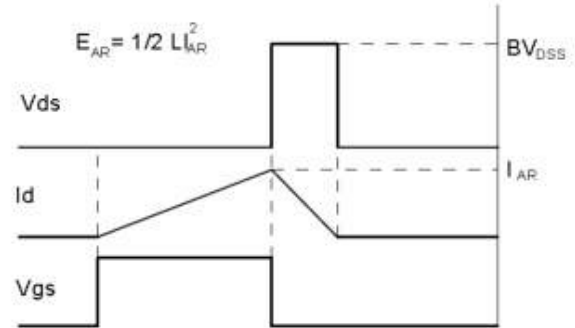
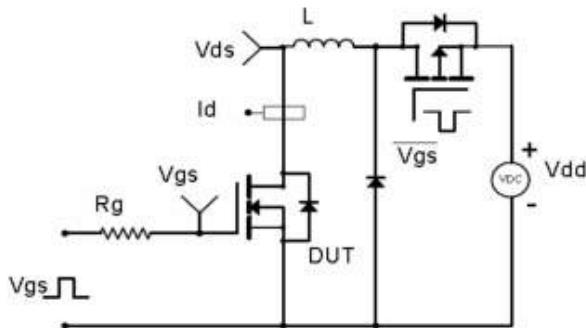
Gate Charge Test Circuit & Waveform



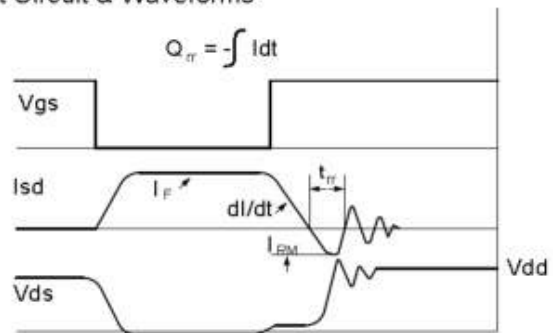
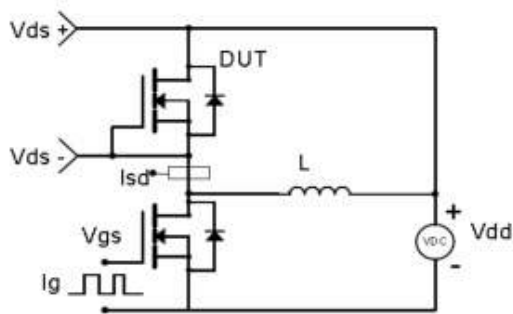
Resistive Switching Test Circuit & Waveforms



Unclamped Inductive Switching (UIS) Test Circuit & Waveforms



Diode Recovery Test Circuit & Waveforms



Typical Performance Characteristics - P channel

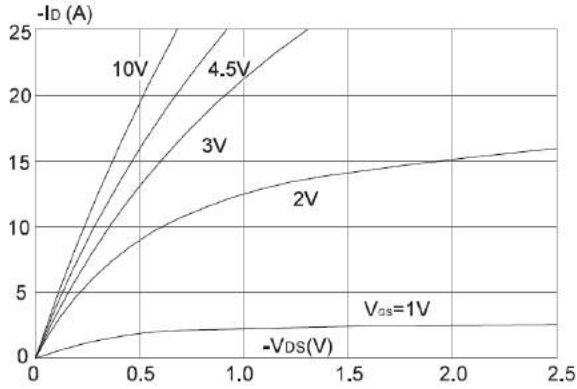


Fig.1 Output Characteristics

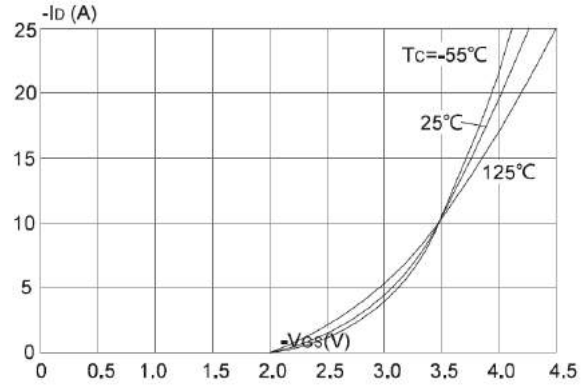


Fig.4 Typical Transfer Characteristics

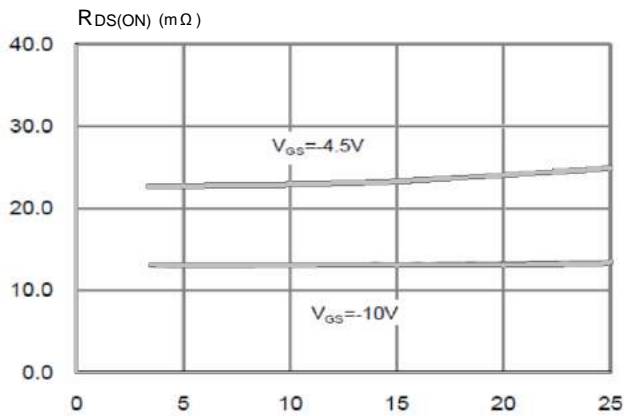


Fig.2 On-resistance vs. Drain Current

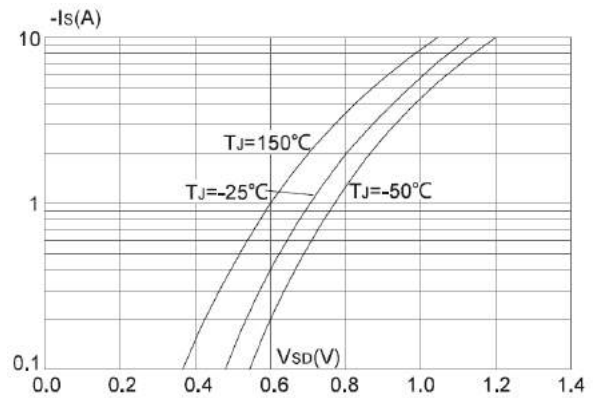


Fig. 5 Body Diode Characteristics

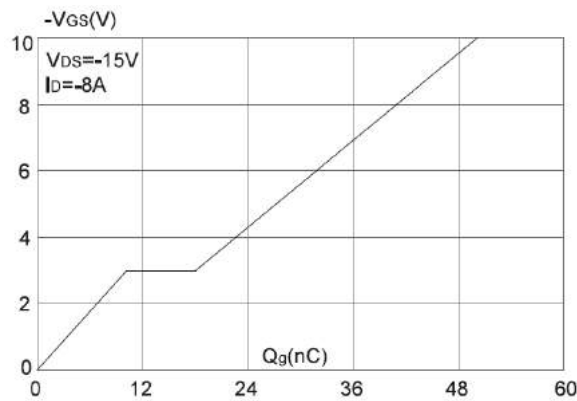


Fig.3 Gate Charge Characteristics

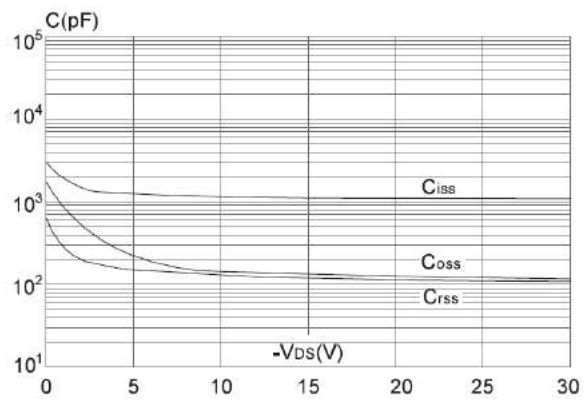


Fig. 6 Capacitance Characteristics

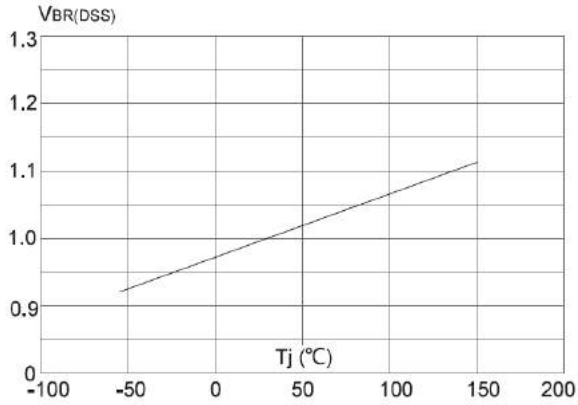


Fig.7 Normalized Breakdown Voltage vs. Junction Temperature

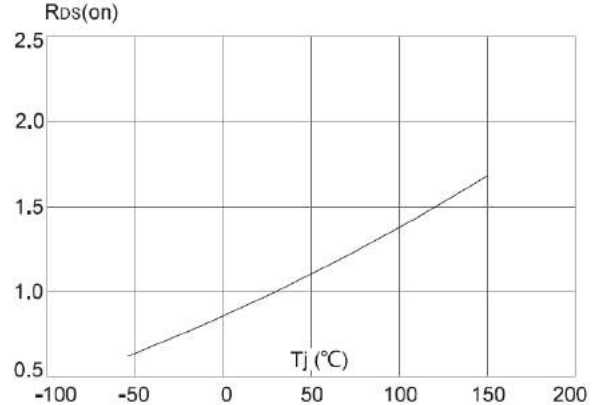


Fig. 9 Normalized on Resistance vs. Junction Temperature

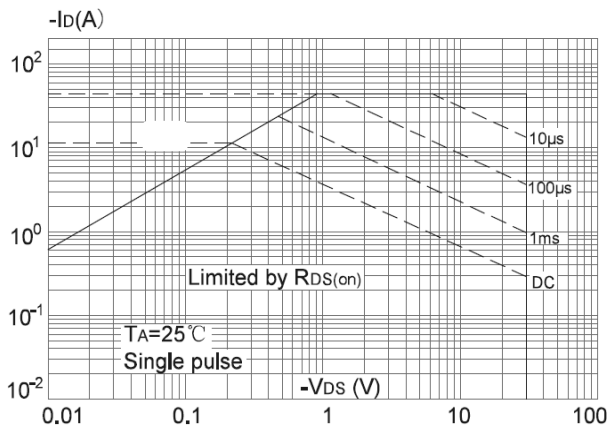


Fig.8 Safe Operating Area

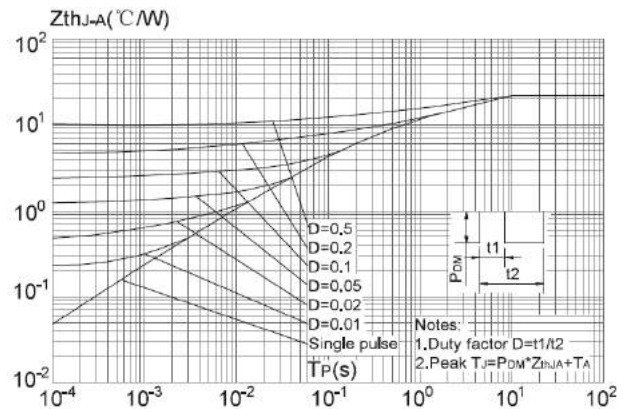
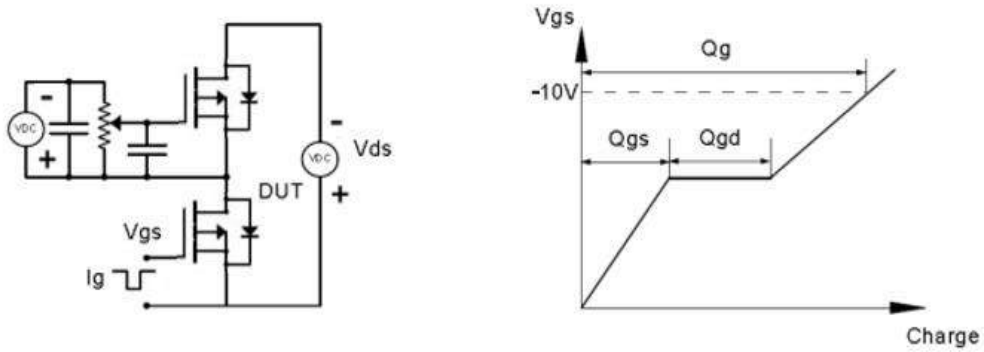


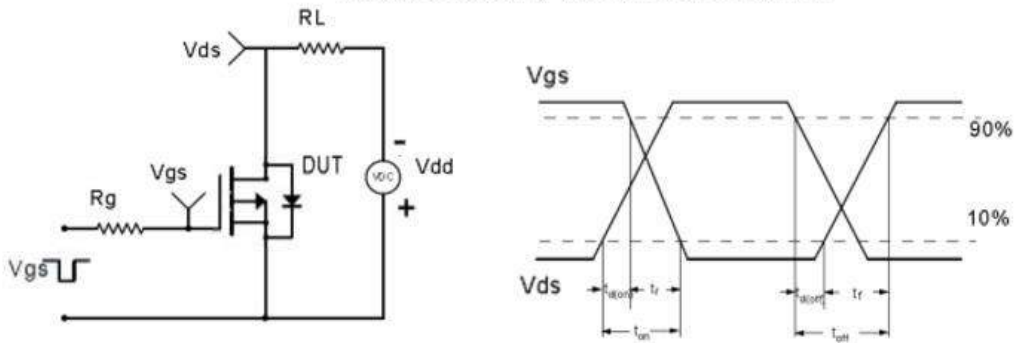
Fig. 10 Transient Thermal Response Curve

Test Circuit & Waveform

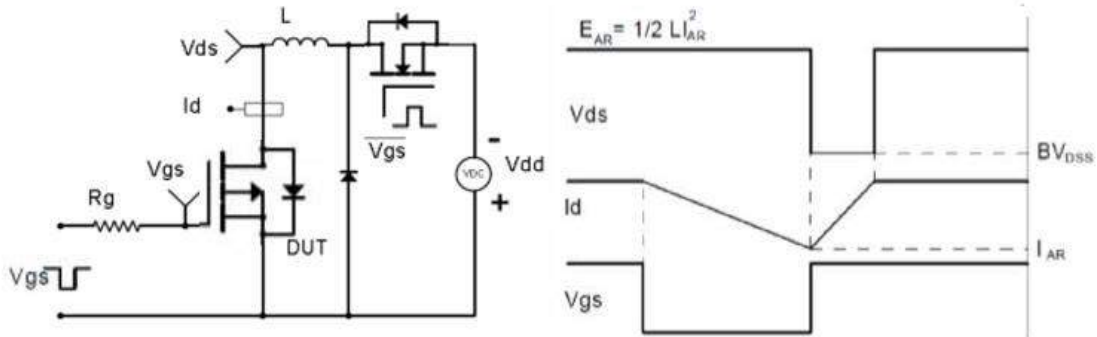
Gate Charge Test Circuit & Waveform



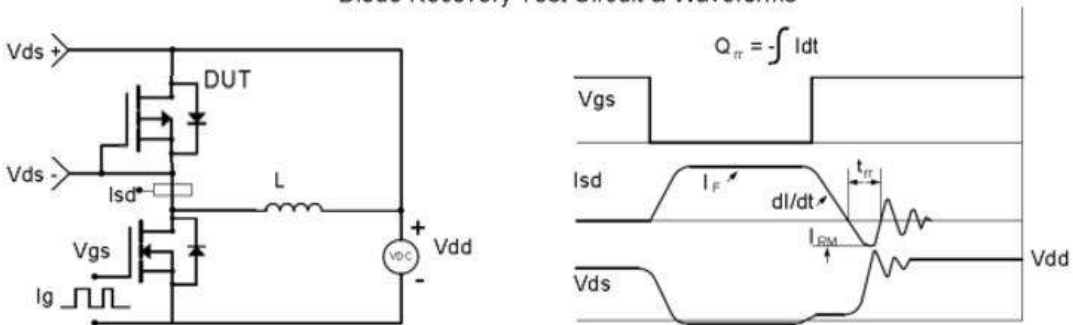
Resistive Switching Test Circuit & Waveforms



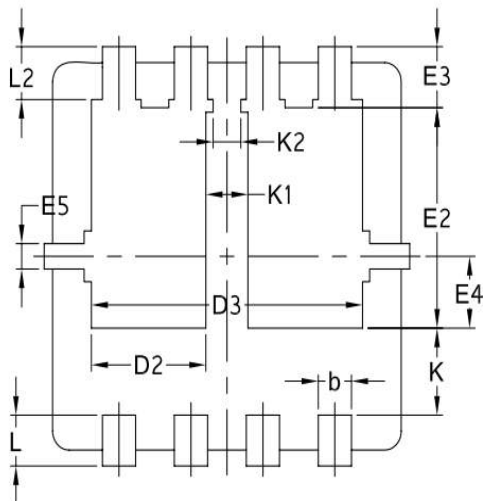
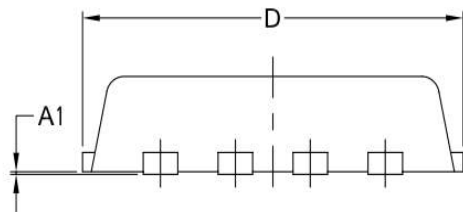
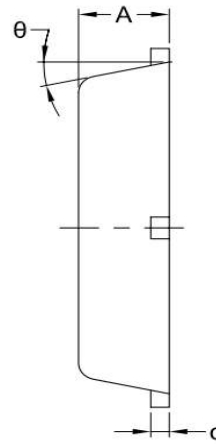
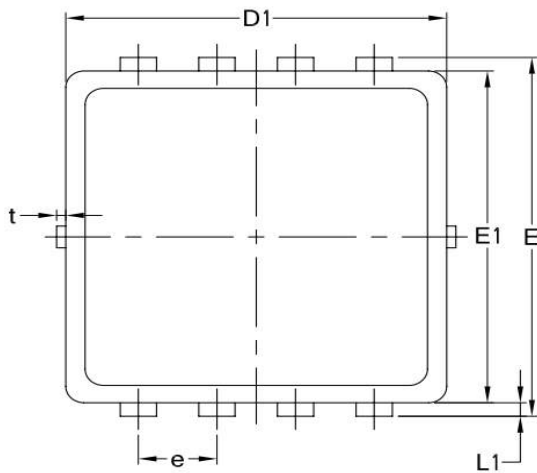
Unclamped Inductive Switching (UIS) Test Circuit & Waveforms



Diode Recovery Test Circuit & Waveforms



DFN3x3-8L Package Information



SYMBOL	COMMON		
	MM		
	MIN	NOM	MAX
A	0.70	0.75	0.85
A1	/	/	0.05
b	0.25	0.30	0.39
c	0.14	0.152	0.20
D	3.20	3.30	3.45
D1	3.05	3.15	3.25
D2	0.84	1.04	1.24
D3	2.30	2.45	2.60
E	3.20	3.30	3.40
E1	2.95	3.05	3.15
E2	1.60	1.74	1.90
E3	0.28	0.48	0.68
E4	0.37	0.57	0.77
E5	0.10	0.20	0.30
e	0.60	0.65	0.70
K	0.50	0.69	0.80
K1	0.30	0.38	0.53
K2	0.15	0.25	0.35
L	0.30	0.40	0.50
L1	0.06	0.125	0.20
L2	0.27	0.42	0.57
t	0	0.075	0.13
θ	10°	12°	14°

Customer Service

Sales and Service:

zj@ztasemi.com