

## Features

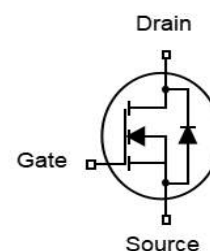
- N-Channel
- Low  $R_{DS(on)}$  & FOM
- Extremely low switching loss
- Excellent reliability and uniformity
- Fast switching and soft recovery
- 100% EAS Tested

$V_{DS}$	30	V
$R_{DS(on),TYP@ V_{GS}=10V}$	0.92	m $\Omega$
$R_{DS(on),TYP@ V_{GS}=4.5V}$	1.25	m $\Omega$
$I_D$	170	A

DFN5x6



Part ID	Package Type	Marking	Packing
ZTG009N03GC	DFN5x6	ZTG009N03GC	5000pcs/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	150	$^\circ\text{C}$	
$T_{STG}$	Storage Temperature Range	-55 to 150	$^\circ\text{C}$	
$I_{DM}$	Drain Current-Continuous@ Current-Pulsed (Note 1)	$T_C = 25^\circ\text{C}$ 680	A	
<b>Mounted on Large Heat Sink</b>				
$I_D$	Drain Current-Continuous	$T_C = 25^\circ\text{C}$	170	A
		$T_C = 100^\circ\text{C}$	108	A
$P_D$	Maximum Power Dissipation (Note 2)	130	W	
$R_{\theta JC}$	Thermal Resistance-Junction to Case	0.96	$^\circ\text{C}/\text{W}$	
$R_{\theta JA}$	Thermal Resistance Junction-Ambient (Note 3)	50	$^\circ\text{C}/\text{W}$	
<b>Drain-Source Avalanche Ratings</b>				
EAS	Avalanche Energy, Single Pulsed (Note 7)	256	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
I <sub>DSS</sub>	Zero Gate Voltage Drain Current	V <sub>DS</sub> =30V, 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	1.3	1.8	2.3	V
R <sub>DS(on)</sub>	Drain-Source On-State Resistance	V <sub>GS</sub> =10V, I <sub>D</sub> =20A	--	0.92	1.15	mΩ
R <sub>DS(on)</sub>	Drain-Source On-State Resistance	V <sub>GS</sub> =4.5V, I <sub>D</sub> =15A	--	1.25	1.7	mΩ
<b>Dynamic Electrical Characteristics @ T<sub>J</sub> = 25°C (unless otherwise stated) (Note 5)</b>						
C <sub>iss</sub>	Input Capacitance	V <sub>DS</sub> =15V, V <sub>GS</sub> =0V, f=1MHz	--	5903	--	pF
C <sub>oss</sub>	Output Capacitance		--	3216	--	pF
C <sub>rss</sub>	Reverse Transfer Capacitance		--	204	--	pF
R <sub>g</sub>	Gate Resistance	f=1MHz	--	1.3	--	Ω
Q <sub>g</sub>	Total Gate Charge	V <sub>DS</sub> =15V, I <sub>D</sub> =20A, V <sub>GS</sub> =4.5V	--	40	--	nC
Q <sub>gs</sub>	Gate-Source Charge		--	23	--	nC
Q <sub>gd</sub>	Gate-Drain Charge		--	9.9	--	nC
<b>Switching Characteristics (Note 5)</b>						
T <sub>d(on)</sub>	Turn-on Delay Time	V <sub>DD</sub> =20V, I <sub>D</sub> =15A, R <sub>G</sub> =3.0Ω, V <sub>GS</sub> =4.5V	--	43	--	ns
T <sub>r</sub>	Turn-on Rise Time		--	80	--	ns
T <sub>d(off)</sub>	Turn-Off Delay Time		--	52	--	ns
T <sub>f</sub>	Turn-Off Fall Time		--	32	--	ns
<b>Source- Drain Diode Characteristics @ T<sub>J</sub> = 25°C (unless otherwise stated)</b>						
I <sub>S</sub>	Diode Forward Current (Note 3)		--	--	170	A
V <sub>SD</sub>	Forward on voltage (Note 6)	I <sub>S</sub> =10A, V <sub>GS</sub> =0V	--	--	1.4	V
T <sub>rr</sub>	Reverse Recovery Time (Note 4)	T <sub>J</sub> =25°C, I <sub>S</sub> = I <sub>F</sub> di/dt=100A/μs	--	67	--	ns
Q <sub>rr</sub>	Reverse Recovery Charge		--	90	--	nC

**Notes:**

1. Repetitive Rating: Pulse width limited by maximum junction temperature. Ratings are based on low frequency and duty cycles to keep initial T<sub>J</sub>=25° C.
2. The power dissipation PD is based on T<sub>J(MAX)</sub>=150°C, using junction-to-case thermal resistance.
3. Surface Mounted on 1in2 FR-4 board with 2oz. Copper, in a still air environment with T<sub>A</sub> =25°C.
4. Pulse Test: Pulse Width ≤ 300μs, Duty Cycle ≤ 2%.
5. Guaranteed by design, not subject to production.
6. The maximum current limited by package
7. EAS condition : T<sub>J</sub>=25°C, V<sub>DD</sub>=15V, V<sub>G</sub>=10V, L=0.5mH, R<sub>g</sub>=25Ω

TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

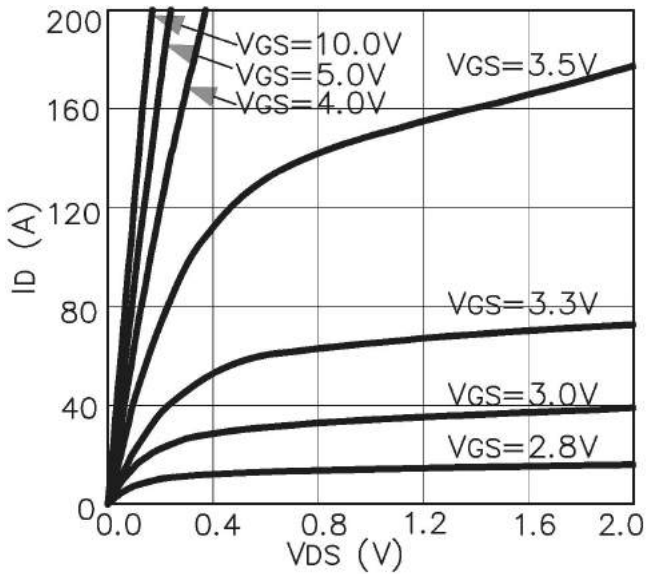


Figure 1 Output Characteristics

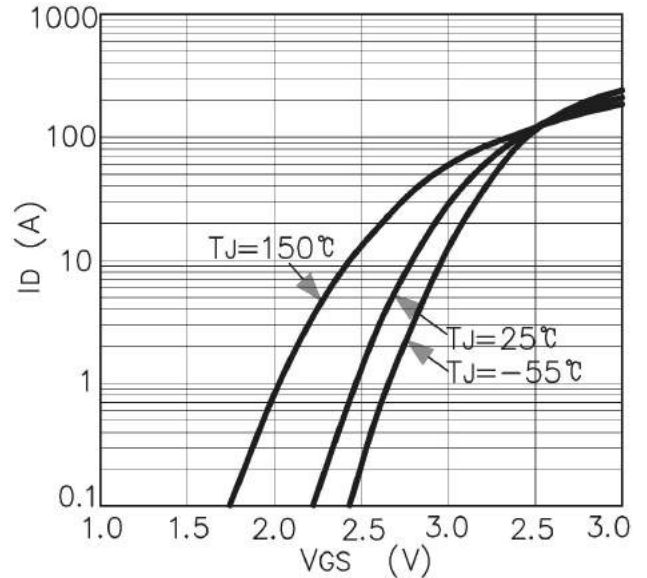


Figure 4 Transfer Characteristics

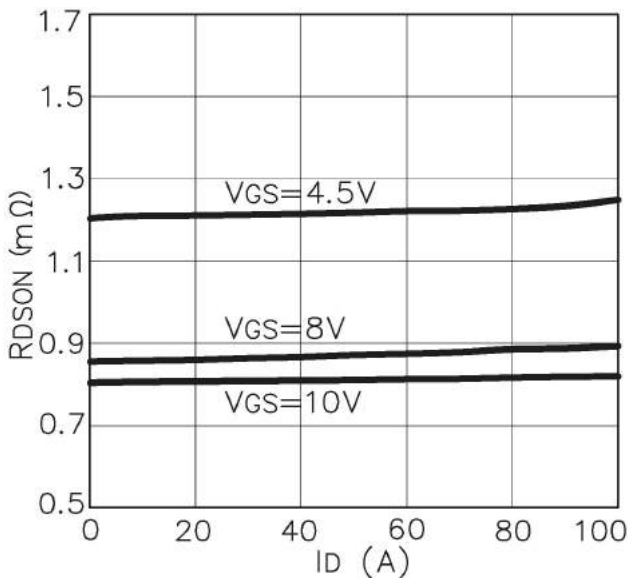


Figure 2 Rdson- Drain Current

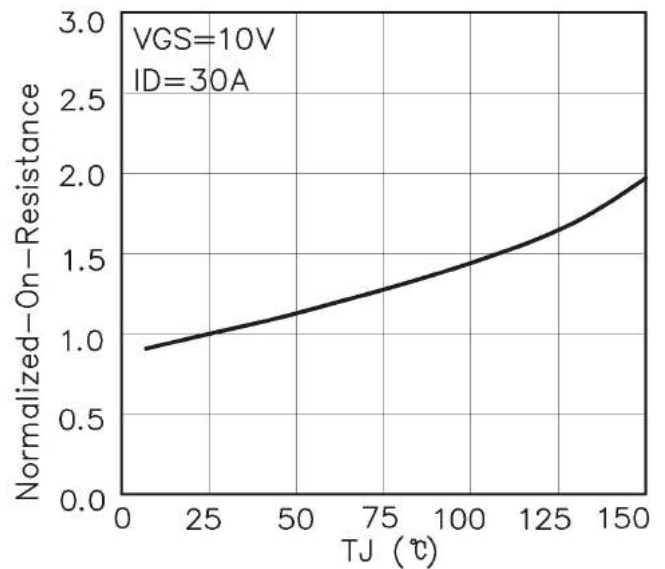


Figure 5 Rdson-Junction Temperature

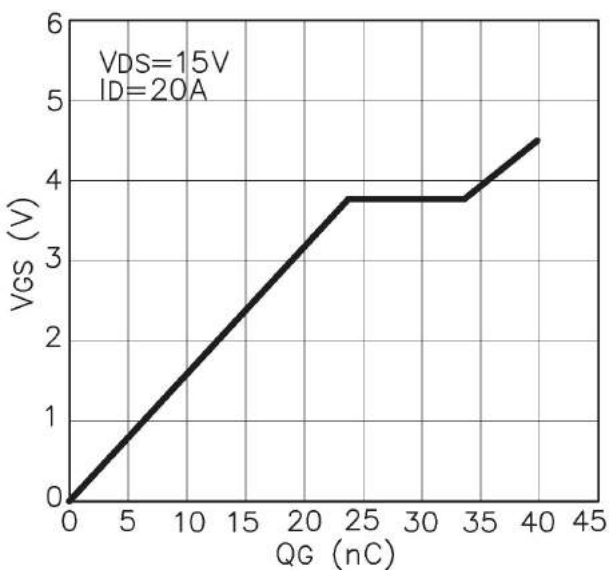


Figure 3 Gate Charge

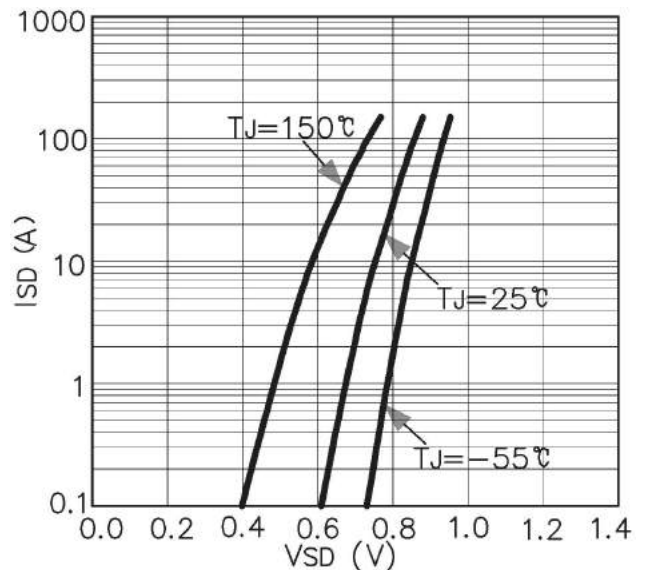
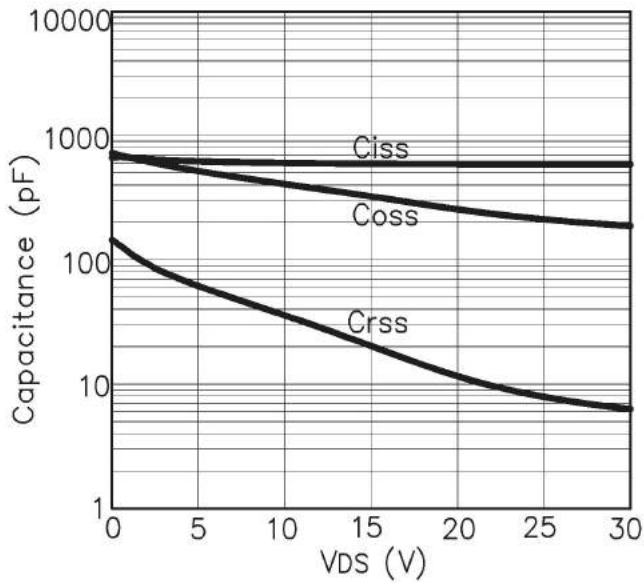
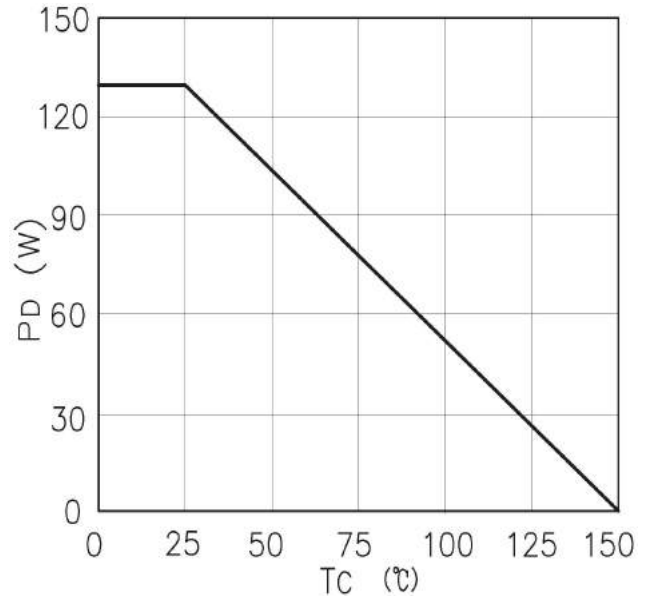


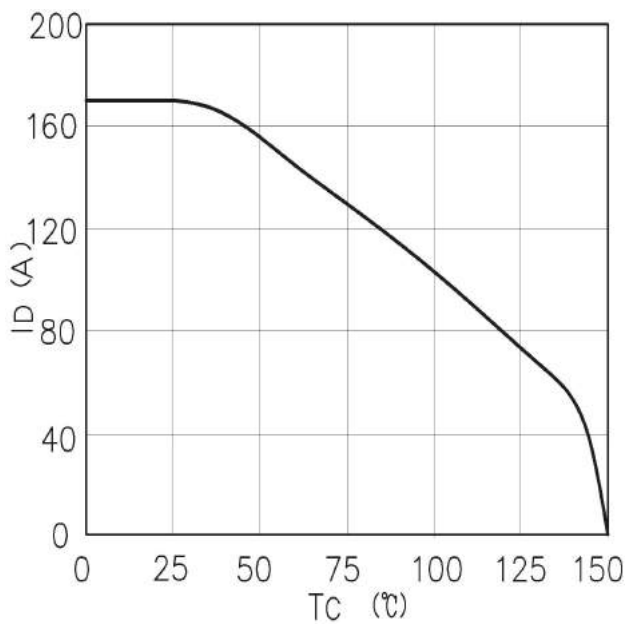
Figure 6 Source-Drain Diode Forward



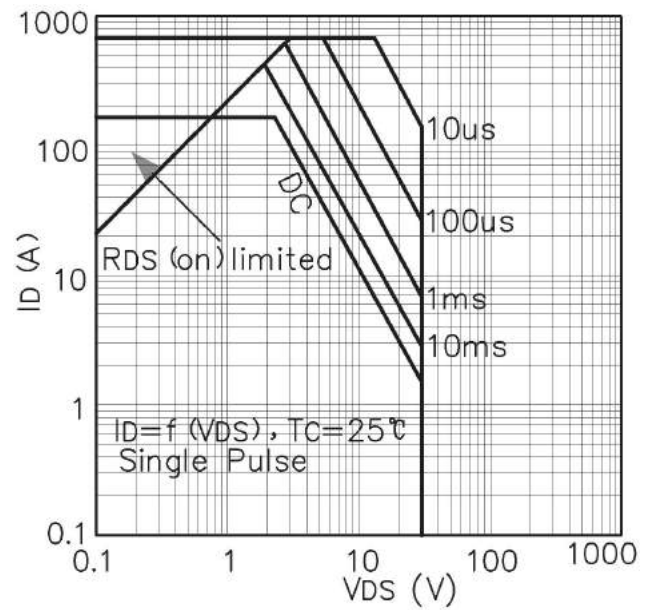
**Figure 7 Capacitance vs Vds**



**Figure 9 Power De-rating**



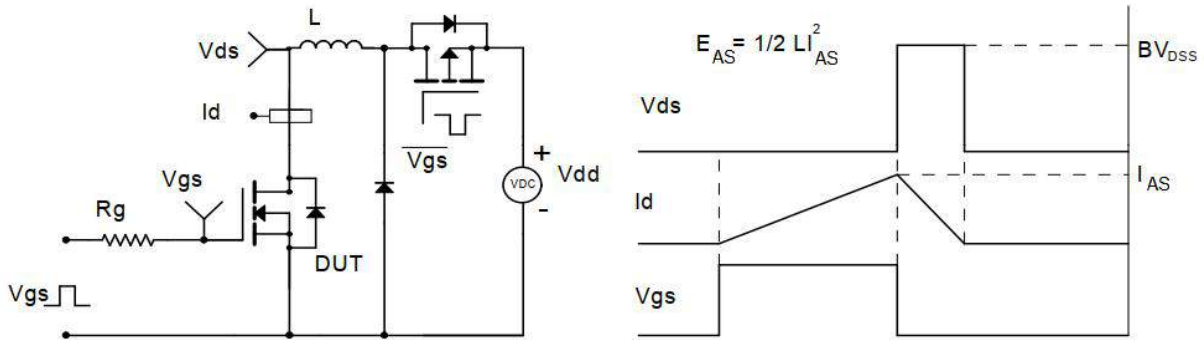
**Figure 8 Current De-rating**



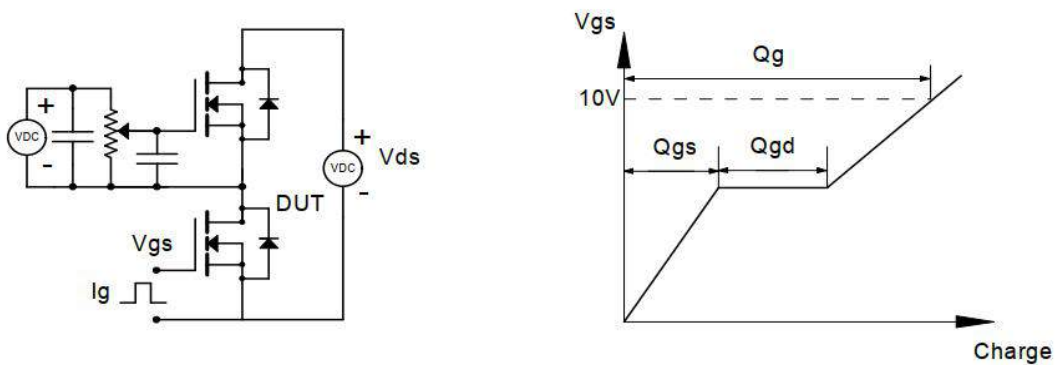
**Figure 10 Safe Operation Area**

Test circuit&Waveform

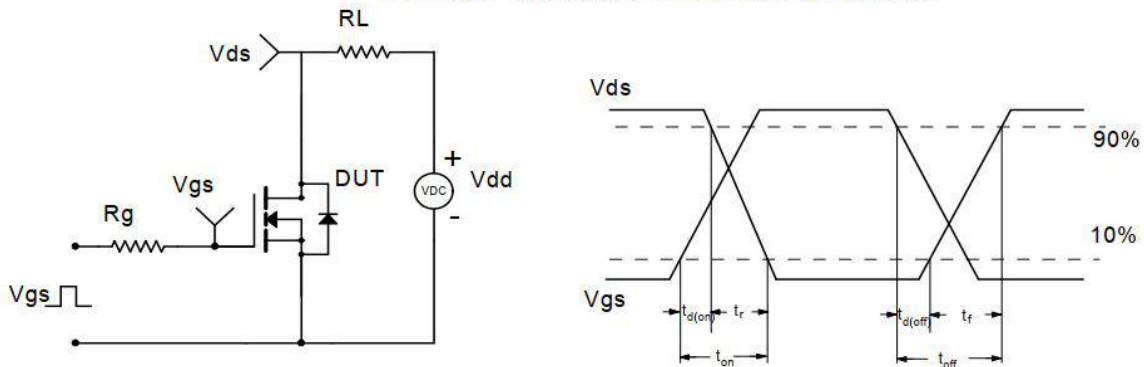
Unclamped Inductive Switching (UIS) Test Circuit & Waveforms



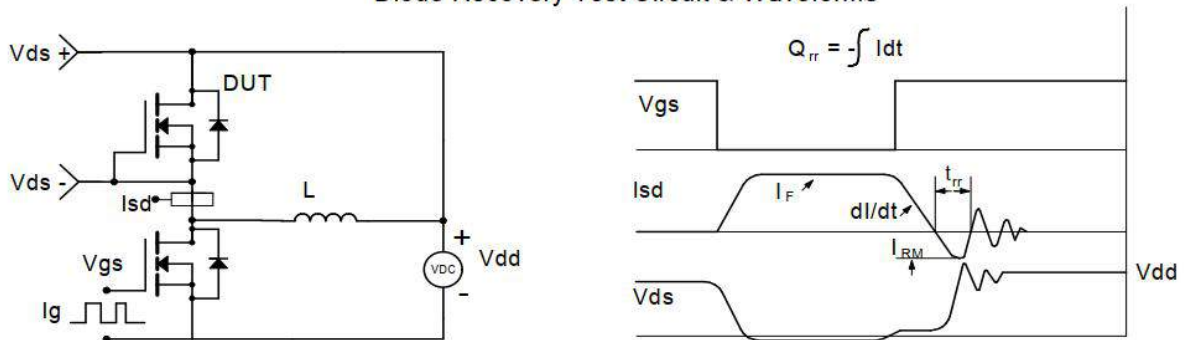
Gate Charge Test Circuit & Waveform



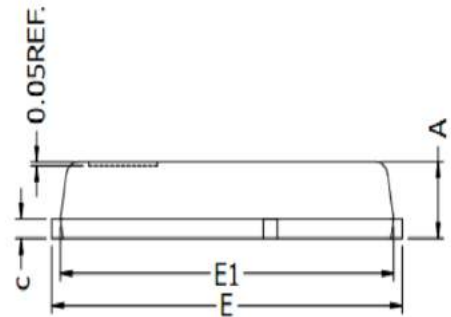
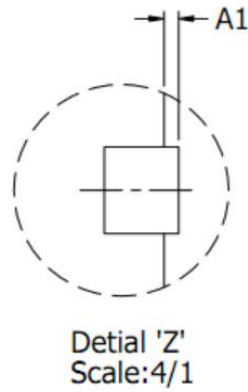
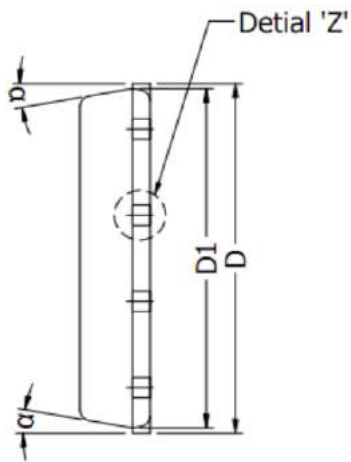
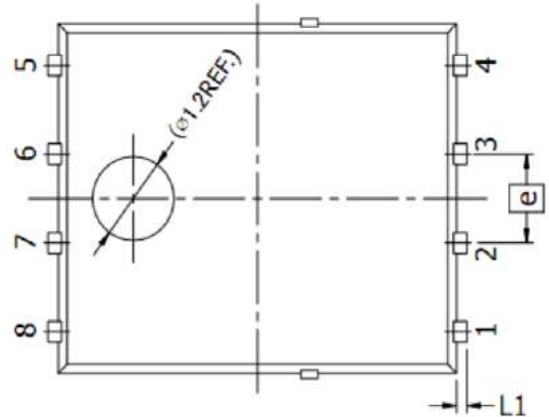
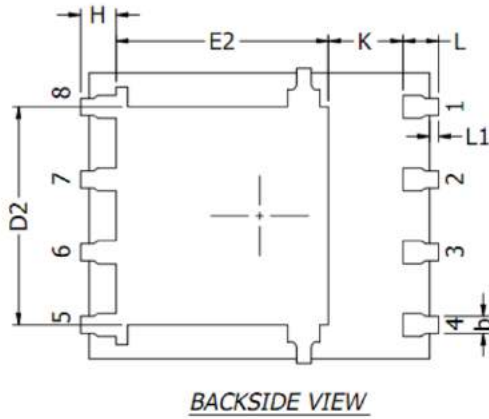
Resistive Switching Test Circuit & Waveforms



Diode Recovery Test Circuit & Waveforms



## DFN5x6-8L Package Information



DIM.	MILLIMETERS		
	MIN.	NOM.	MAX.
A	0.90	1.00	1.10
A1	0	-	0.05
b	0.30	0.40	0.50
c	0.20	0.25	0.30
D	5.15 BSC		
D1	5.00 BSC		
D2	3.76	3.81	3.86
E	6.15 BSC		
E1	5.80	5.85	5.90
E2	3.45	3.65	3.85
e	1.27 BSC		
H	0.51	0.61	0.71
K	1.10	-	-
L	0.51	0.61	0.71
L1	0.08	0.15	0.23
$\alpha$	10°	11°	12°

## Customer Service

Sales and Service:  
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