
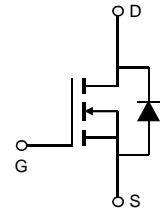
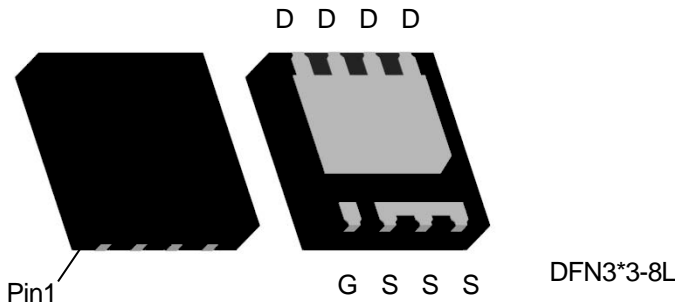


**TM1503C1**  
**N-CHANNEL POWER MOSFET**

<p>General Description</p> <ul style="list-style-type: none"> <li>● Switching Application</li> <li>● Power Management for DC/DC</li> <li>● Battery Protection</li> </ul>	<p>Product Summary</p> <ul style="list-style-type: none"> <li>● 30V/34A</li> <li>● <math>R_{DS(ON)} = 7.1\text{m}\Omega(\text{typ.}) @ V_{GS} = 10\text{V}</math></li> <li>● <math>R_{DS(ON)} = 10.0\text{m}\Omega(\text{typ.}) @ V_{GS} = 4.5\text{V}</math></li> <li>● Reliable and Rugged</li> <li>● Halogen Free and Green Devices Available (RoHS Compliant)</li> </ul> <p>100% UIS Tested                  100% <math>R_g</math> Tested</p> 
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**Pin Description**



**Absolute Maximum Ratings**

Symbol	Parameter	Rating	Unit
<b>Common Ratings</b> ( $T_c=25^\circ\text{C}$ Unless Otherwise Noted)			
$V_{DSS}$	Drain-Source Voltage	30	V
$V_{GSS}$	Gate-Source Voltage	$\pm 20$	V
$T_J$	Junction Temperature Range	-55 to 150	$^\circ\text{C}$
$T_{STG}$	Storage Temperature Range	-55 to 150	$^\circ\text{C}$
$I_S$	Source Current-Continuous(Body Diode)	$T_c=25^\circ\text{C}$ 34	A
<b>Mounted on Large Heat Sink</b>			
$I_{DM}$	Pulsed Drain Current *	$T_c=25^\circ\text{C}$ 120	A
$I_D$	Continuous Drain Current	$T_c=25^\circ\text{C}$ 34	A
		$T_c=100^\circ\text{C}$ 21.6	A
$P_D$	Maximum Power Dissipation	$T_c=25^\circ\text{C}$ 17.8	W
		$T_c=100^\circ\text{C}$ 7.1	W
$R_{\theta JC}$	Thermal Resistance, Junction-to-Case	7	$^\circ\text{C/W}$
$R_{\theta JA}$	Thermal Resistance, Junction-to-Ambient **	75	$^\circ\text{C/W}$
$E_{AS}$	SinglePulsed-Avalanche Energy ***	$L=0.1\text{mH}$ 12	mJ

Note: \* Repetitive rating; pulse width limited by max.junction temperature.  
 \*\* Surface mounted on 1in2 FR-4 board.  
 \*\*\* Limited by  $T_{Jmax}$ , starting  $T_J=25^\circ\text{C}$ ,  $L = 0.1\text{mH}$ ,  $R_g = 25\Omega$ ,  $V_{GS} = 10\text{V}$ .

## Electrical Characteristics (T<sub>c</sub> =25°C Unless Otherwise Noted)

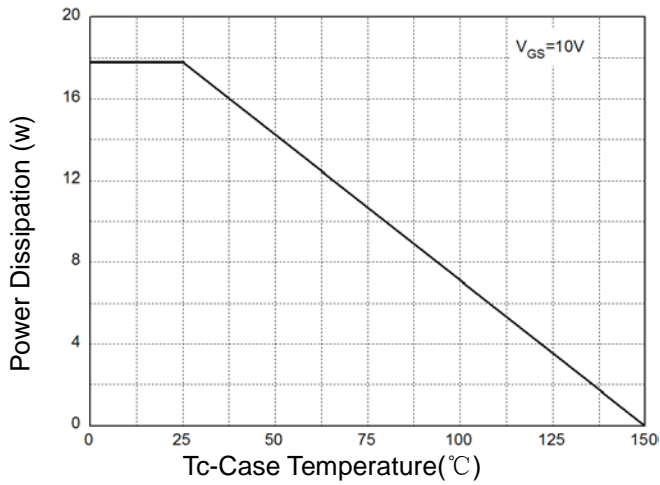
Symbol	Parameter	Test Conditions	1503			Unit
			Min	Typ.	Max	
<b>Static Characteristics</b>						
B <sub>VDS</sub>	Drain-Source Breakdown Voltage	V <sub>GS</sub> =0V, I <sub>DS</sub> =250μA	30	-	-	V
I <sub>DSS</sub>	Drain-to-Source Leakage Current	V <sub>DS</sub> =30V, V <sub>GS</sub> =0V	-	-	1	μA
		T <sub>j</sub> =125°C	-	-	50	μA
V <sub>GS(th)</sub>	Gate Threshold Voltage	V <sub>DS</sub> =V <sub>GS</sub> , I <sub>DS</sub> =250μA	1	1.6	3	V
I <sub>GSS</sub>	Gate-Source Leakage Current	V <sub>GS</sub> =±20V, V <sub>DS</sub> =0V	-	-	±100	nA
R <sub>DS(ON)</sub> *	Drain-Source On-State Resistance	V <sub>GS</sub> =10V, I <sub>DS</sub> =10A	-	7.1	8.5	mΩ
		V <sub>GS</sub> =4.5V, I <sub>DS</sub> =10A	-	10.0	12.5	mΩ
<b>Diode Characteristics</b>						
V <sub>SD</sub> *	Diode Forward Voltage	I <sub>SD</sub> =10A, V <sub>GS</sub> =0V	-	0.7	1.0	V
t <sub>rr</sub>	Reverse Recovery Time	I <sub>SD</sub> =10A, dI <sub>SD</sub> /dt=100A/μs	-	15	-	ns
Q <sub>rr</sub>	Reverse Recovery Charge		-	35	-	nC

Symbol	Parameter	Test Conditions	1503			Unit
			Min	Typ.	Max	
<b>Dynamic Characteristics</b>						
R <sub>G</sub>	Gate Resistance	V <sub>GS</sub> =0V, V <sub>DS</sub> =0V, F=1MHz	-	1.0	-	Ω
C <sub>iss</sub>	Input Capacitance	V <sub>GS</sub> =0V, V <sub>DS</sub> =15V, Frequency=1.0MHz	-	680	-	pF
C <sub>oss</sub>	Output Capacitance		-	150	-	
C <sub>rss</sub>	Reverse Transfer Capacitance		-	70	-	
t <sub>d(ON)</sub>	Turn-on Delay Time		V <sub>DD</sub> =10V, R <sub>G</sub> =4Ω, I <sub>DS</sub> =10A, V <sub>GS</sub> =10V	-	4.8	-
T <sub>r</sub>	Turn-on Rise Time	-		12.5	-	
t <sub>d(OFF)</sub>	Turn-off Delay Time	-		27.6	-	
T <sub>f</sub>	Turn-off Fall Time	-		8.2	-	
<b>Gate Charge Characteristics</b>						
Q <sub>g</sub>	Total Gate Charge	V <sub>DS</sub> =24V, V <sub>GS</sub> =10V, I <sub>D</sub> =10A	-	14.6	-	nC
Q <sub>gs</sub>	Gate-Source Charge		-	1.97	-	
Q <sub>gd</sub>	Gate-Drain Charge		-	3.75	-	

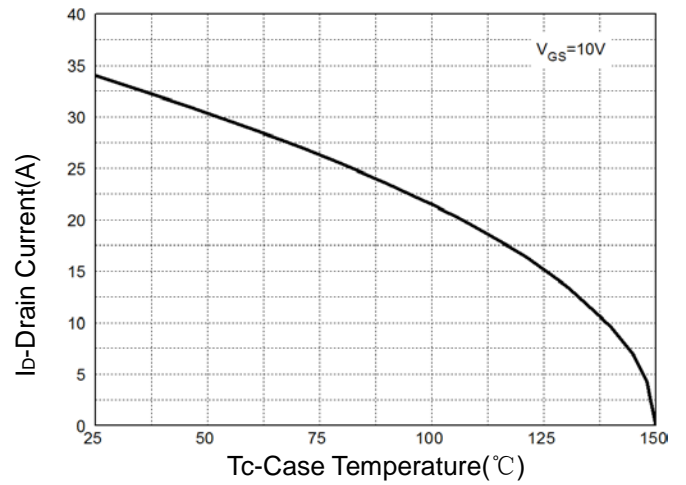
Note: \*Pulse test, pulse width ≤ 300us, duty cycle ≤ 2%

# Typical Operating Characteristics

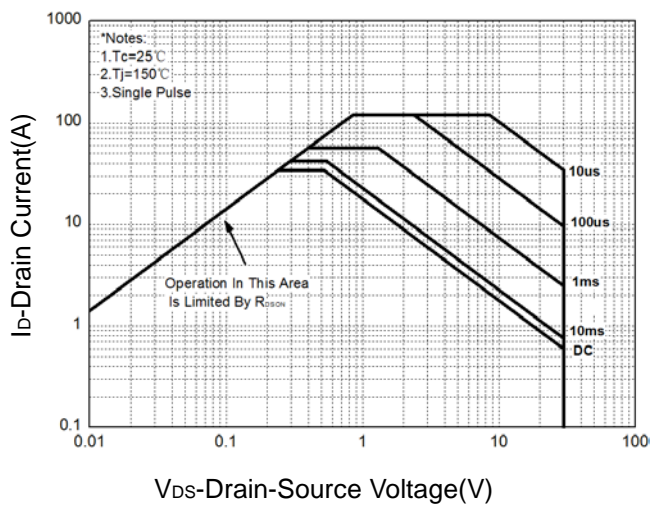
**Figure 1: Power Dissipation**



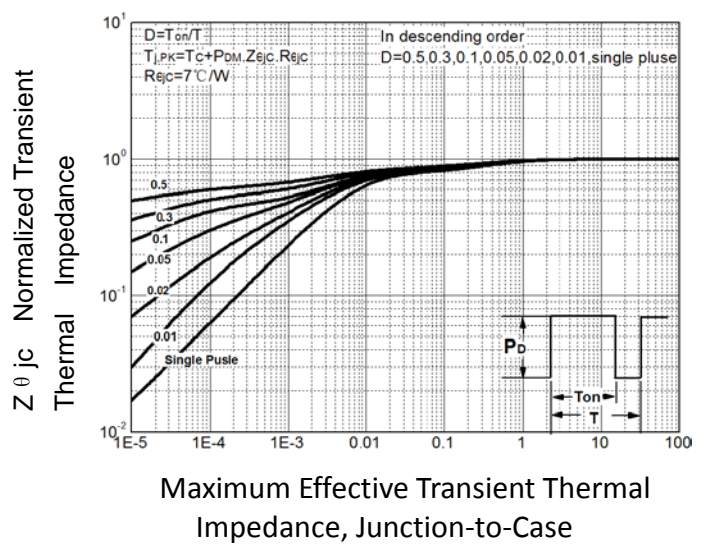
**Figure 2: Drain Current**



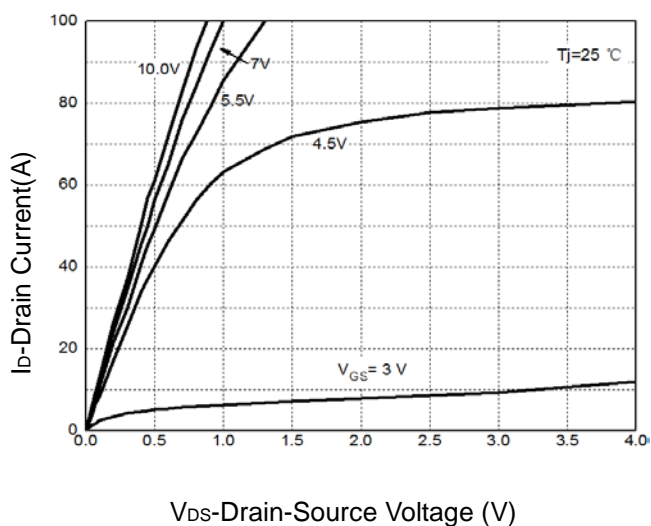
**Figure 3: Safe Operation Area**



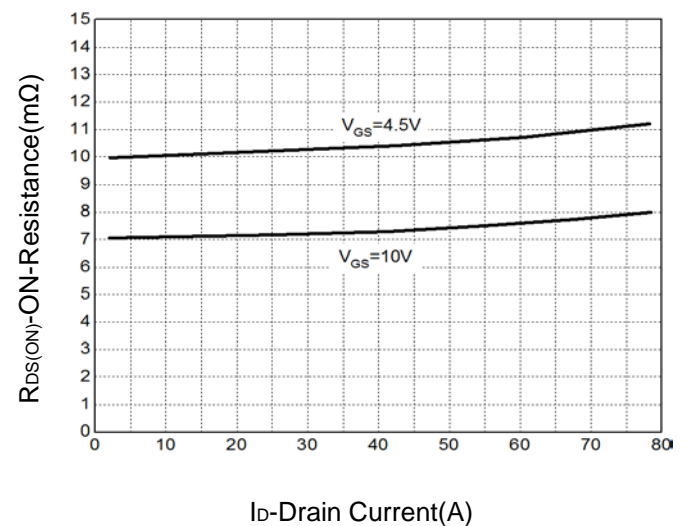
**Figure 4: Thermal Transient Impedance**



**Figure 5: Output Characteristics**

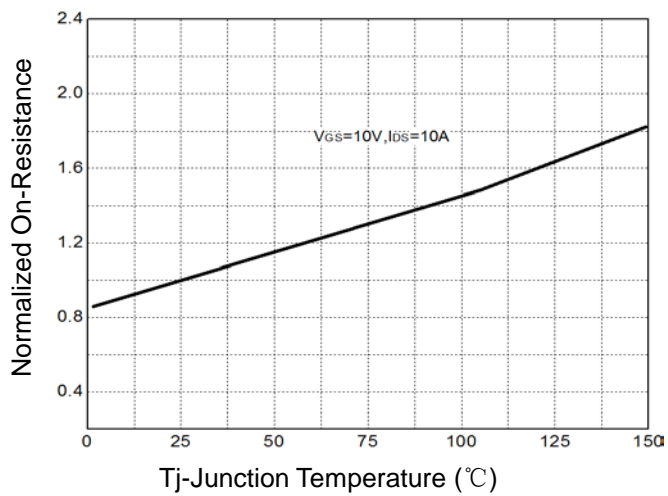


**Figure 6: Drain-Source On Resistance**

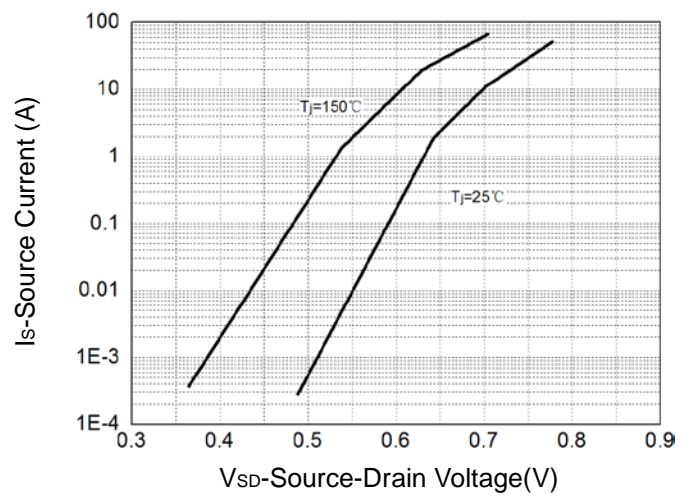


## Typical Operating Characteristics(Cont.)

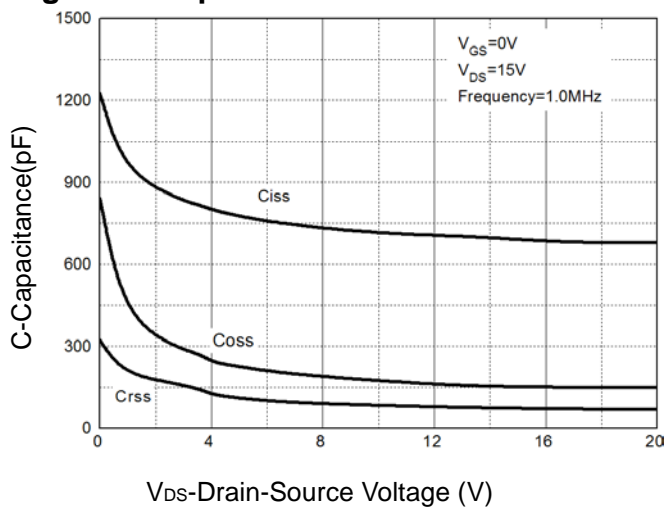
**Figure 7: On-Resistance vs. Temperature**



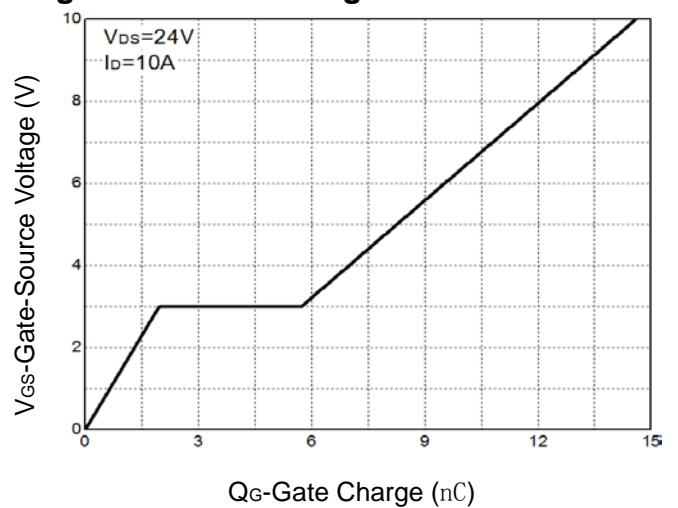
**Figure 8: Source-Drain Diode Forward**



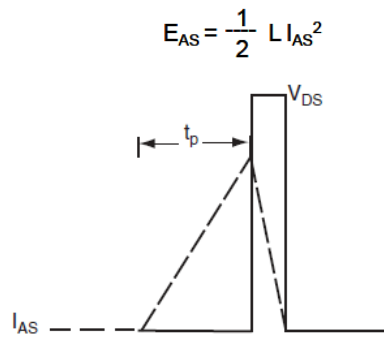
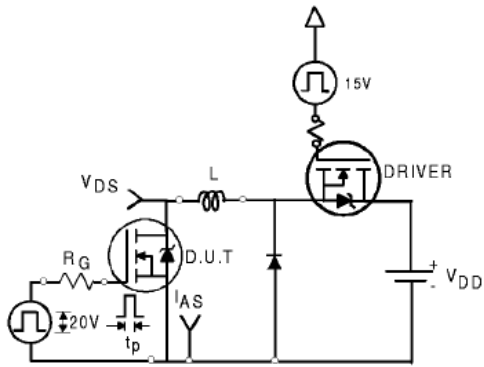
**Figure 9: Capacitance Characteristics**



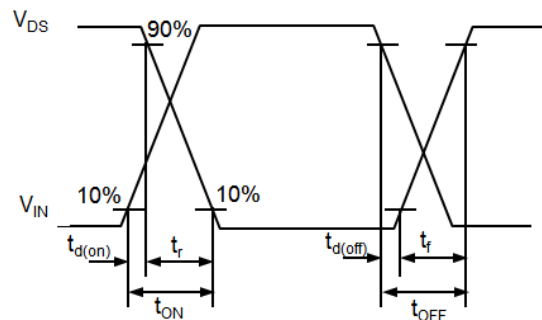
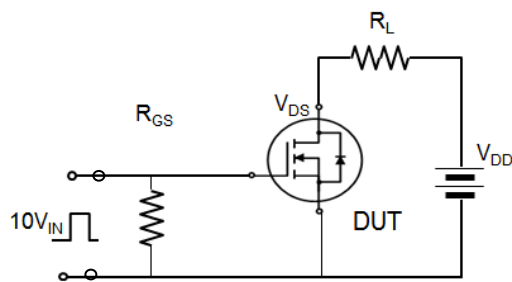
**Figure 10: Gate Charge Characteristics**



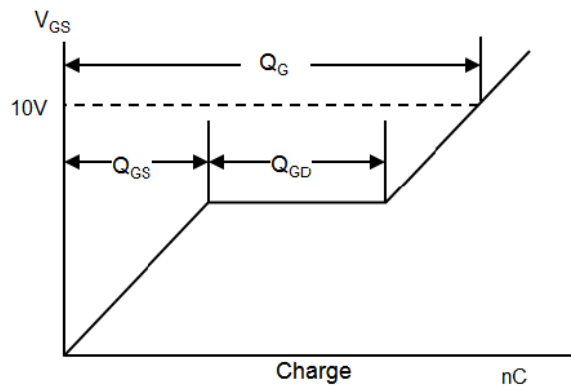
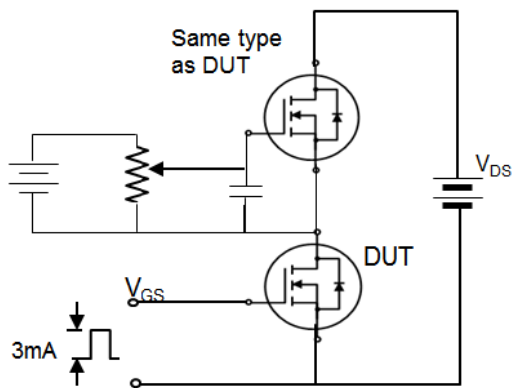
## Avalanche Test Circuit



## Switching Time Test Circuit

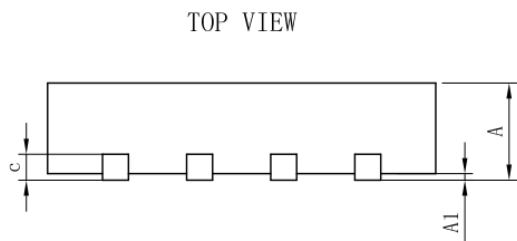
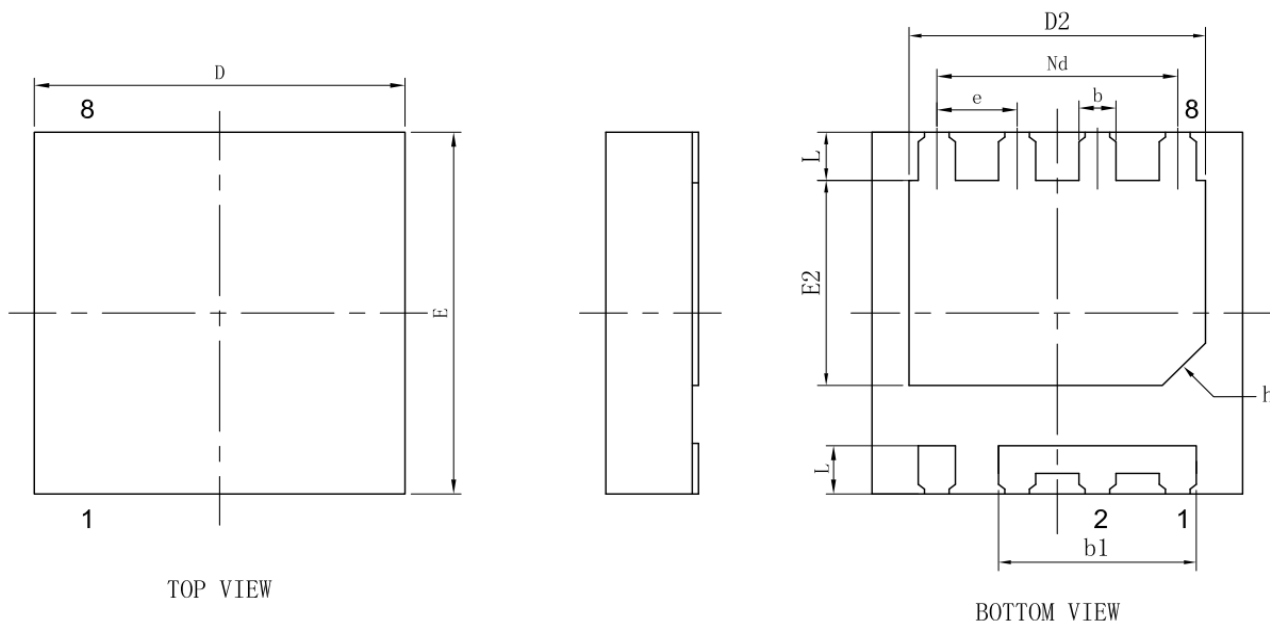


## Gate Charge Test Circuit



# Package Information

DFN3\*3-8L



SYMBOL	MILLIMETER		
	MIN	NOM	MAX
A	0.70	0.75	0.80
A1	0.00	0.02	0.05
b	0.25	0.30	0.35
b1	1.55	1.60	165.00
c	0.19	0.20	0.21
D	2.90	3.00	3.10
D2	2.30	2.40	2.50
Nd	1.90	1.95	2.00
E	2.90	3.00	3.10
E2	1.60	1.70	1.80
e	0.65bsc		
L	0.35	0.40	0.45
h	0.30	0.35	0.40