

### • General Description

It combines advanced trench MOSFET technology with a low resistance package to provide extremely low  $R_{DS(ON)}$ . It combines one N channel MOSFET and one P channel MOSFET.

### • Features

- Advance high cell density Trench technology
- Low  $R_{DS(ON)}$  to minimize conductive loss
- Low Gate Charge for fast switching
- Dual DIE in one package

### • Application

- Power Management in Notebook Computer
- BLDC Motor driver

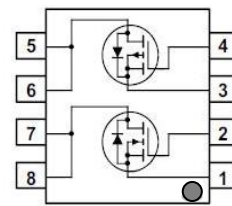
### • Ordering Information:

Part NO.	ZMC88303N
Marking	ZMC88303
Packing Information	REEL TAPE
Basic ordering unit (pcs)	3000

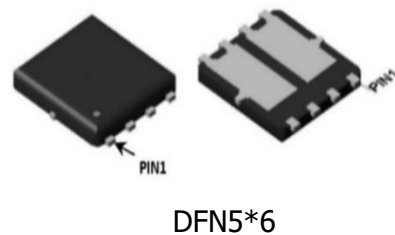
### • N Channel Absolute Maximum Ratings ( $T_C = 25^\circ\text{C}$ )

Parameter	Symbol	Rating	Unit
Drain-Source Voltage	$V_{DS}$	30	V
Gate-Source Voltage	$V_{GS}$	20	V
Continuous Drain Current	$I_D @ T_C = 25^\circ\text{C}$	23	A
	$I_D @ T_C = 75^\circ\text{C}$	17.5	A
	$I_D @ T_C = 100^\circ\text{C}$	14.5	A
Pulsed Drain Current <sup>①</sup>	$I_{DM}$	69	A
Total Power Dissipation	$P_D @ T_C = 25^\circ\text{C}$	43	W
Total Power Dissipation	$P_D @ T_A = 25^\circ\text{C}$	2.3	W
Operating Junction Temperature	$T_J$	-55 to 150	$^\circ\text{C}$
Storage Temperature	$T_{STG}$	-55 to 150	$^\circ\text{C}$
Single Pulse Avalanche Energy	$E_{AS}$	30	mJ

### • Product Summary



$V_{DS1} = 30\text{V}$   
 $V_{DS2} = -30\text{V}$   
 $R_{DS(ON)1} = 10\text{m}\Omega$   
 $R_{DS(ON)2} = 30\text{m}\Omega$   
 $I_{D1} = 23\text{A}$   
 $I_{D2} = -14\text{A}$



**•P Channel Absolute Maximum Ratings (T<sub>C</sub> =25°C)**

Parameter	Symbol	Rating	Unit
Drain-Source Voltage	V <sub>DS</sub>	-30	V
Gate-Source Voltage	V <sub>GS</sub>	±20	V
Continuous Drain Current	I <sub>D</sub> @T <sub>C</sub> =25°C	-14	A
	I <sub>D</sub> @T <sub>C</sub> =75°C	-10.6	A
	I <sub>D</sub> @T <sub>C</sub> =100°C	-8.8	A
Pulsed Drain Current ④	I <sub>DM</sub>	-42	A
Total Power Dissipation	P <sub>D</sub> @T <sub>C</sub> =25°C	43	W
Total Power Dissipation	P <sub>D</sub> @T <sub>A</sub> =25°C	2.3	W
Operating Junction Temperature	T <sub>J</sub>	-55 to 150	°C
Storage Temperature	T <sub>STG</sub>	-55 to 150	°C
Single Pulse Avalanche Energy	E <sub>AS</sub>	67	mJ

**•Thermal resistance**

Parameter	Symbol	Min.	Typ.	Max.	Unit
Thermal resistance, junction - case	R <sub>thJC</sub>	-	-	2.9	° C/W
Thermal resistance, junction - ambient	R <sub>thJA</sub>	-	-	53	° C/W
Soldering temperature, wavesoldering for 10s	T <sub>sold</sub>	-	-	265	° C

**•N Channel Electronic Characteristics**

Parameter	Symbol	Condition	Min.	Typ	Max.	Unit
Drain-Source Breakdown Voltage	BV <sub>DSS</sub>	V <sub>GS</sub> =0V, I <sub>D</sub> =250uA	30			V
Gate Threshold Voltage	V <sub>GS(TH)</sub>	V <sub>GS</sub> =V <sub>DS</sub> , I <sub>D</sub> =250uA	1.2		2.5	V
Drain-Source Leakage Current	I <sub>DSS</sub>	V <sub>DS</sub> =30V, V <sub>GS</sub> =0V			1.0	uA
Gate- Source Leakage Current	I <sub>GSS</sub>	V <sub>GS</sub> =±20V, V <sub>DS</sub> =0V			±100	nA
Static Drain-source On Resistance	R <sub>DS(ON)</sub>	V <sub>GS</sub> =10V, I <sub>D</sub> =12A		10	13	mΩ
		V <sub>GS</sub> =4.5V, I <sub>D</sub> =10A		13	17	mΩ
Forward Trans conductance	g <sub>FS</sub>	V <sub>DS</sub> =25V, I <sub>D</sub> =5A		9		s
Source-drain voltage	V <sub>SD</sub>	I <sub>S</sub> =23A			1.28	V

**•Dynamic Characteristics**

Parameter	Symbol	Condition	Min.	Typ	Max.	Unit
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Input capacitance	Ciss	f = 1MHz V <sub>DS</sub> =25V	-	560	-	pF
Output capacitance	Coss		-	81	-	
Reverse transfer capacitance	Crss		-	49	-	
Total gate charge	Qg	V <sub>DD</sub> = 25V I <sub>D</sub> = 5A V <sub>GS</sub> = 10V	-	10	-	nC
Gate - Source charge	Qgs		-	1.6	-	
Gate - Drain charge	Qgd		-	2.8	-	

#### •P Channel Electronic Characteristics

Parameter	Symbol	Condition	Min.	Typ	Max.	Unit
Drain-Source Breakdown Voltage	BV <sub>DSS</sub>	V <sub>GS</sub> = 0V, I <sub>D</sub> = -250uA	-30			V
Gate Threshold Voltage	V <sub>GS(TH)</sub>	V <sub>GS</sub> = V <sub>DS</sub> , I <sub>D</sub> = -250uA	-1.2		-2.5	V
Drain-Source Leakage Current	I <sub>DSS</sub>	V <sub>DS</sub> = -30V, V <sub>GS</sub> = 0V			1.0	uA
Gate- Source Leakage Current	I <sub>GSS</sub>	V <sub>GS</sub> = ±20V, V <sub>DS</sub> = 0V			±100	nA
Static Drain-source On Resistance	R <sub>DS(ON)</sub>	V <sub>GS</sub> = -10V, I <sub>D</sub> = -9A		30	42	mΩ
		V <sub>GS</sub> = -4.5V, I <sub>D</sub> = -7A		40	52	mΩ
Forward Transconductance	g <sub>FS</sub>	V <sub>DS</sub> = -10V, I <sub>D</sub> = -5A		9		s

#### •Dynamic Characteristics

Parameter	Symbol	Condition	Min.	Typ	Max.	Unit
Input capacitance	Ciss	f = 1MHz V <sub>DS</sub> =-25V	-	850	-	pF
Output capacitance	Coss		-	125	-	
Reverse transfer capacitance	Crss		-	115	-	
Total gate charge	Qg	V <sub>DD</sub> = -25V I <sub>D</sub> = -5A V <sub>GS</sub> = -10V	-	12	-	nC
Gate - Source charge	Qgs		-	5	-	
Gate - Drain charge	Qgd		-	6	-	

•N Channel characteristics curve

Fig.1 Power Dissipation Derating Curve

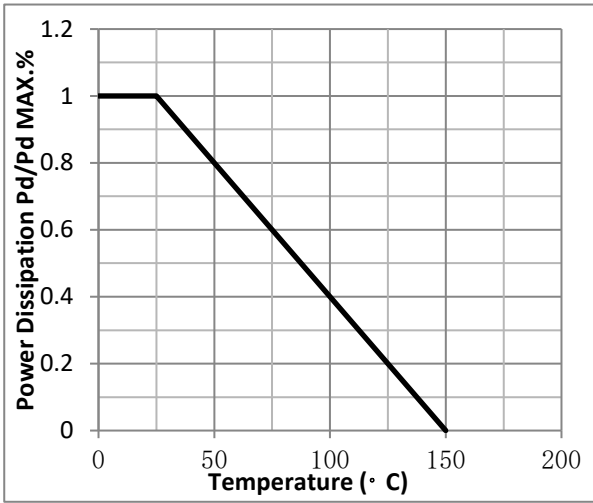


Fig.2 Typical output Characteristics

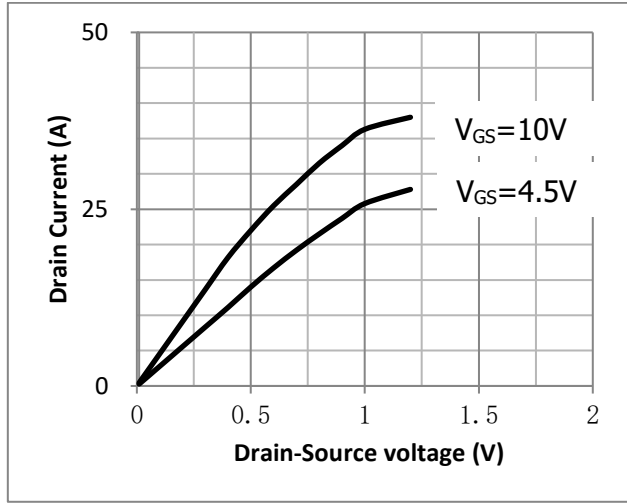


Fig.3 Threshold Voltage V.S Junction Temperature

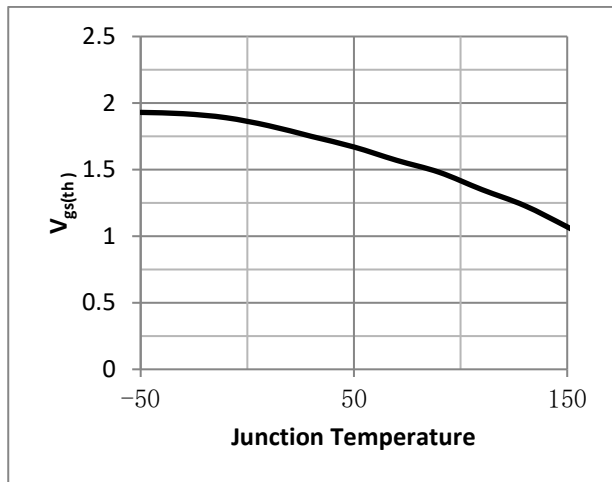


Fig.4 Resistance V.S Drain Current

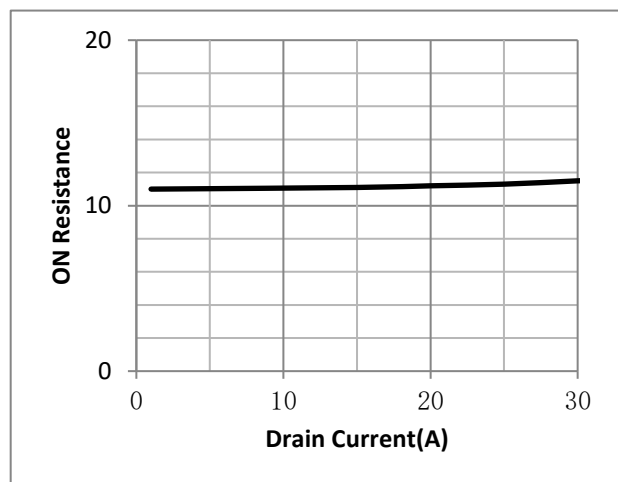


Fig.5 On-Resistance VS Gate Source Voltage

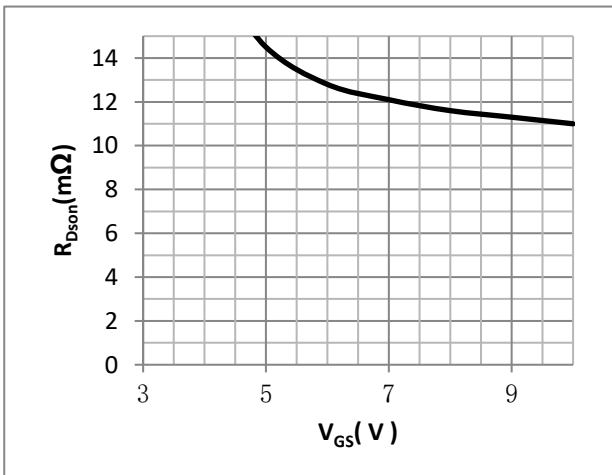
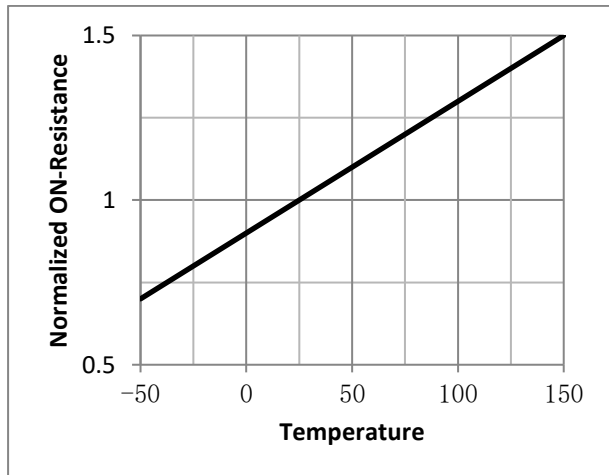


Fig.6 On-Resistance V.S Junction Temperature



•P Channel characteristics curve

Fig.1 Gate-Charge Characteristics

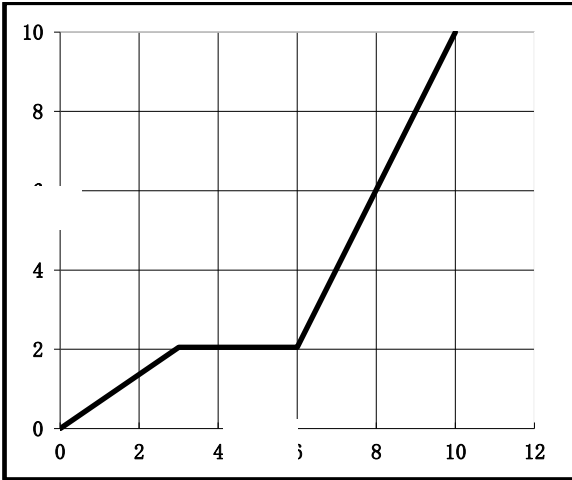


Fig.2 Capacitance Characteristics

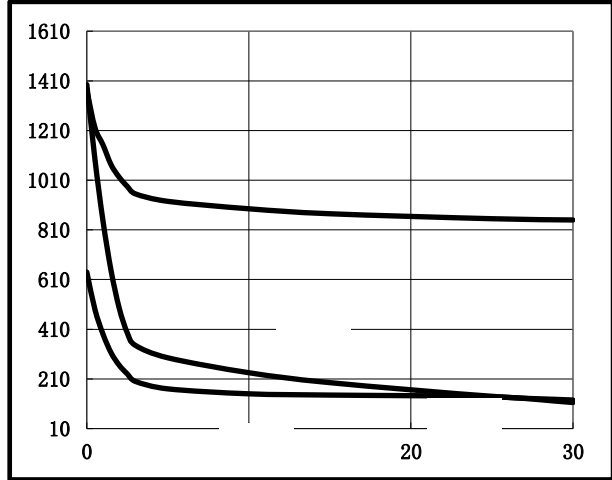


Fig.3 Power Dissipation Derating Curve

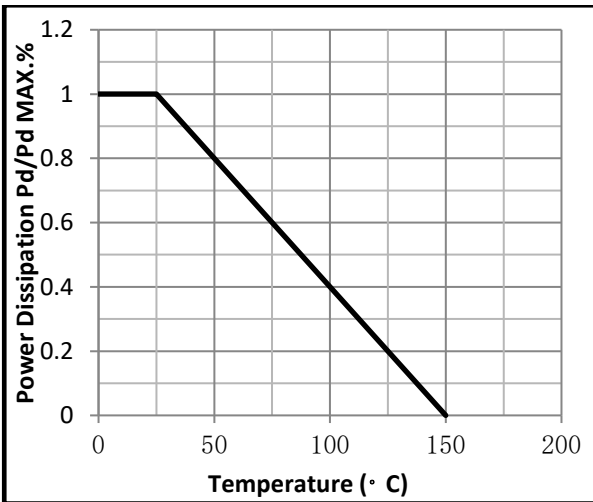


Fig.4 Typical output Characteristics

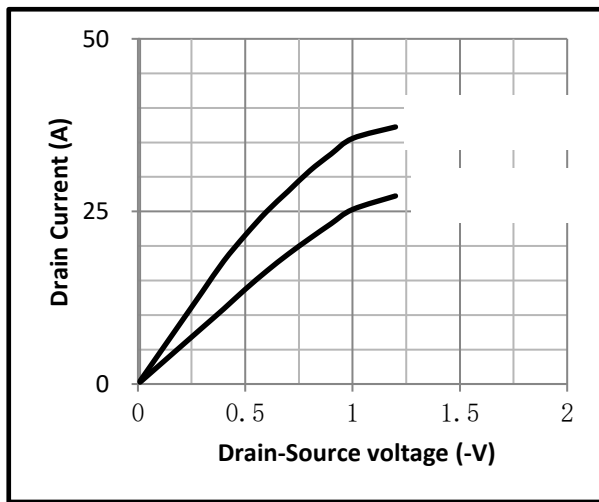


Fig.5 Threshold Voltage V.S Junction Temperature

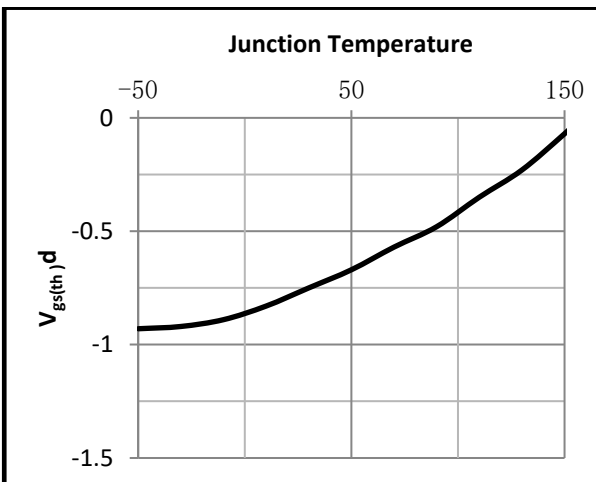


Fig.6 Resistance V.S Drain Current

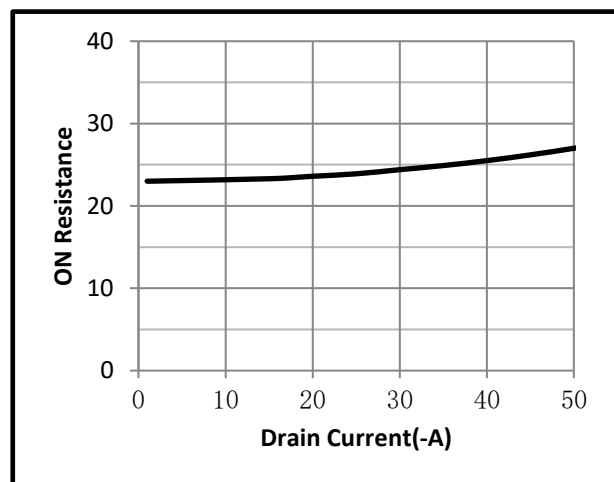


Fig.7 On-Resistance VS Gate Source Voltage

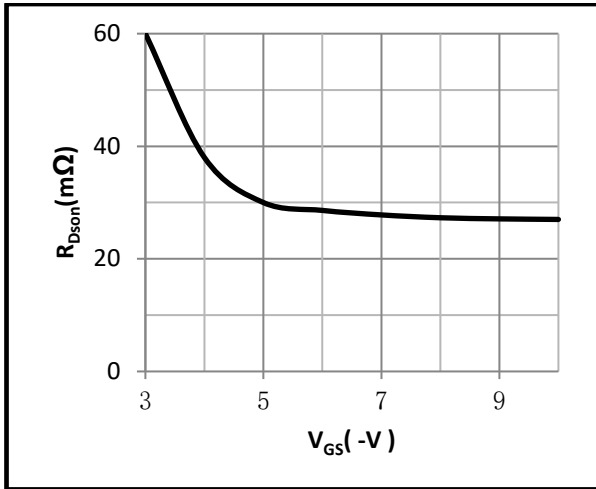


Fig.8 On-Resistance V.S Junction Temperature

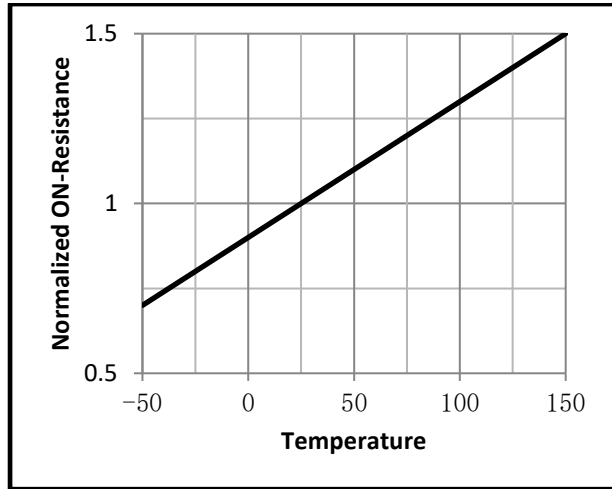


Fig.9 Maximum Forward Biased Safe Operating Area Fig.10 ID-Junction Temperature

•Test Circuit

Fig.1 Switching Time Measurement Circuit

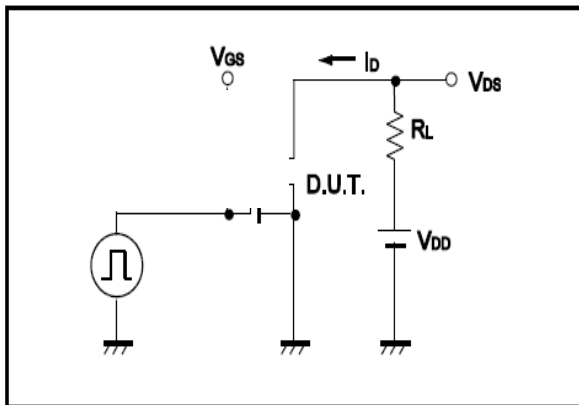


Fig.2 Gate Charge Waveform

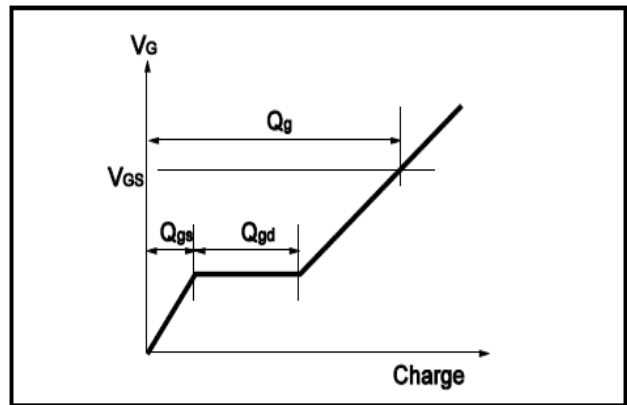


Fig.3 Switching Time Measurement Circuit

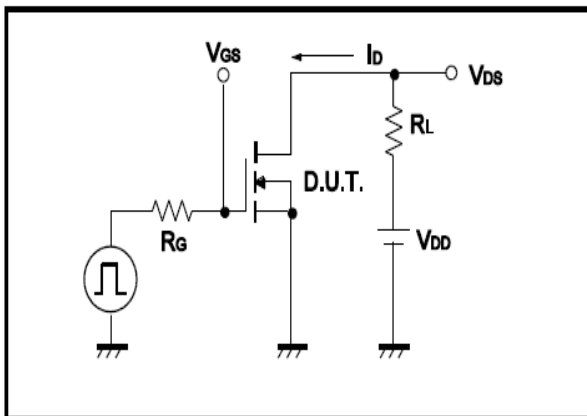


Fig.4 Gate Charge Waveform

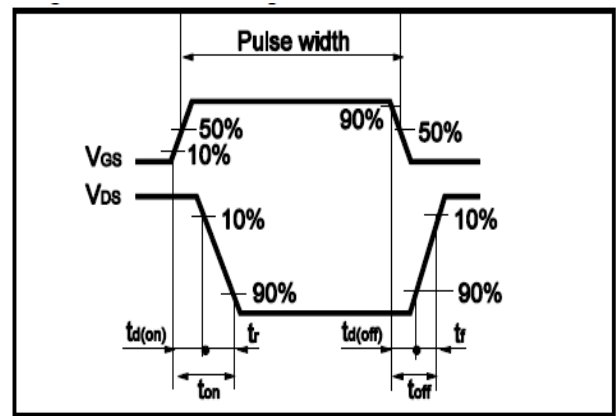


Fig.5 Avalanche Measurement Circuit

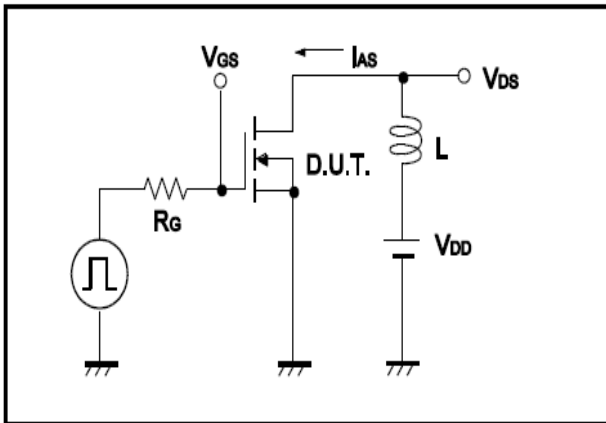
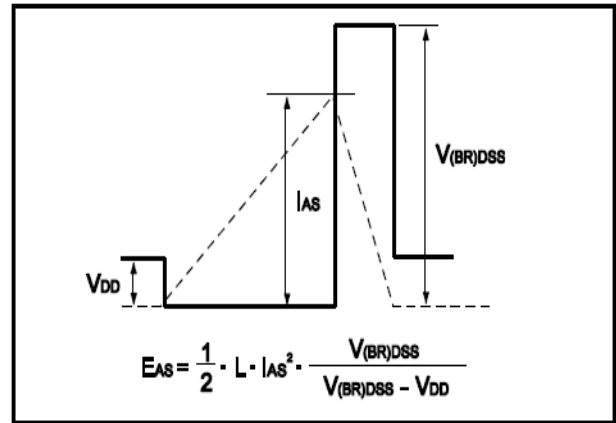
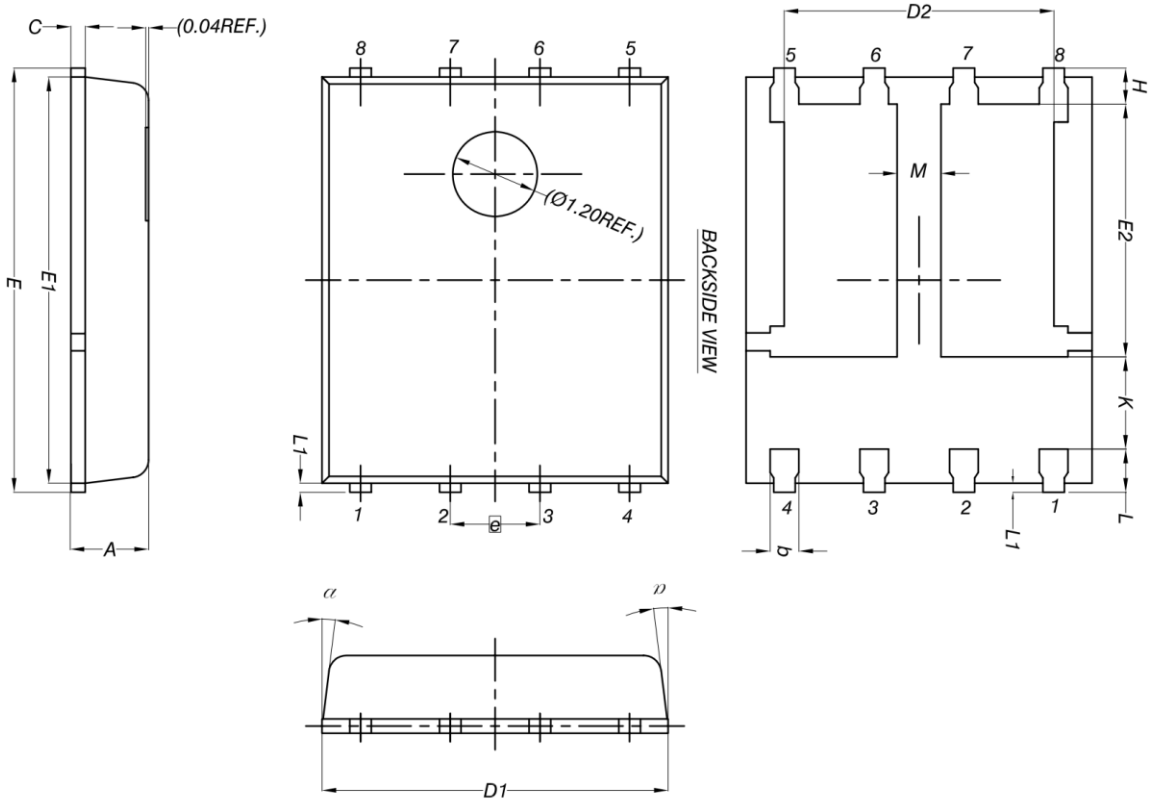


Fig.6 Avalanche Waveform





•Dimensions (DFN5x6)



DIM.	MILLIMETERS		
	MIN.	NOM.	MAX.
A	0.90	1.00	1.10
b	0.33	0.41	0.51
C	0.20	0.25	0.30
D1	4.80	4.90	5.00
D2	3.61	3.81	3.96
E	5.90	6.00	6.10
E1	5.70	5.75	5.80
E2	3.38	3.58	3.78
<span style="border: 1px solid black; padding: 2px;">e</span>	1.27 BSC		
H	0.41	0.51	0.61
K	1.10	-	-
L	0.51	0.61	0.71
L1	0.06	0.13	0.20
M	0.50	-	-
α	0°	-	12°

