

**• General Description**

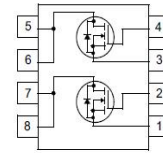
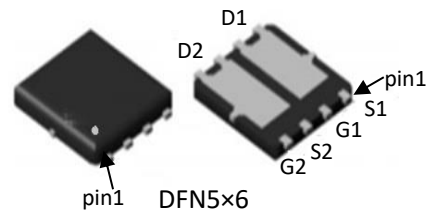
The ZMD68605N combines advanced trench MOSFET technology with a low resistance package to provide extremely low  $R_{DS(ON)}$ .

**• Features**

- Advance high cell density Trench technology
- Low  $R_{DS(ON)}$  to minimize conductive loss
- Low Gate Charge for fast switching
- Low Thermal resistance

**• Application**

- Synchronous Rectification in DC/DC and AC/DC Converters
- Industrial and Motor Drive applications

**• Product Summary**

 $V_{DS}=60V$ 
 $R_{DS(ON)} = 11.5m\Omega$ 
 $I_D=32A$ 

**• Ordering Information:**

Part NO.	ZMD68605N
Marking	ZMD68605
Packing Information	REEL TAPE
Basic ordering unit (pcs)	3000

**• Absolute Maximum Ratings ( $T_C = 25^\circ C$ )**

Parameter	Symbol	Rating	Unit
Drain-Source Voltage	$V_{DS}$	60	V
Gate-Source Voltage	$V_{GS}$	$\pm 20$	V
Continuous Drain Current <sup>②</sup>	$I_D@T_C=25^\circ C$	32	A
	$I_D@T_C=75^\circ C$	24	A
	$I_D@T_C=100^\circ C$	20	A
Pulsed Drain Current <sup>①</sup>	$I_{DM}$	96	A
Total Power Dissipation <sup>②</sup>	$P_D@T_C=25^\circ C$	60	W
Total Power Dissipation	$P_D@T_A=25^\circ C$	3.6	W
Operating Junction Temperature	$T_J$	-55 to 150	$^\circ C$
Storage Temperature	$T_{STG}$	-55 to 150	$^\circ C$
Single Pulse Avalanche Energy@L=0.1mH	$E_{AS}$	60	mJ

**•Thermal resistance**

Parameter	Symbol	Min.	Typ.	Max.	Unit
Thermal resistance, junction - case <sup>②</sup>	R <sub>thJC</sub>	-	-	34	° C/W
Thermal resistance, junction - ambient	R <sub>thJA</sub>	-	-	180	° C/W
Soldering temperature, wavesoldering for 10s	T <sub>sold</sub>	-	-	265	° C

**•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	60			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> =60V, 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> =10A		11.5	14	mΩ
		V <sub>GS</sub> =4.5V, I <sub>D</sub> =8A		14	18	mΩ
Forward Transconductance	g <sub>FS</sub>	V <sub>DS</sub> =25V, I <sub>D</sub> =10A		15		s
Source-drain voltage	V <sub>SD</sub>	I <sub>S</sub> =10A			1.28	V

**•Dynamic Characteristics**

Parameter	Symbol	Condition	Min.	Typ	Max.	Unit
Gate Resistance	R <sub>g</sub>	f = 1MHz		2		Ω
Input capacitance	C <sub>iss</sub>	V <sub>GS</sub> =0V, V <sub>DS</sub> =25V f = 1MHz	-	2520	-	pF
Output capacitance	C <sub>oss</sub>		-	149	-	
Reverse transfer capacitance	C <sub>rss</sub>		-	106	-	
Total gate charge	Q <sub>g</sub>	V <sub>DD</sub> =30V I <sub>D</sub> = 10A V <sub>GS</sub> = 10V	-	30	-	nC
Gate - Source charge	Q <sub>gs</sub>		-	9	-	
Gate - Drain charge	Q <sub>gd</sub>		-	6	-	
Turn-ON Delay time	t <sub>D(on)</sub>	V <sub>GS</sub> =10V, V <sub>DS</sub> =15V R <sub>G</sub> =3.3Ω, I <sub>D</sub> =20A		12		ns
Turn-ON Rise time	t <sub>r</sub>			44		ns
Turn-Off Delay time	t <sub>D(off)</sub>			53		ns
Turn-Off Fall time	t <sub>f</sub>			13		ns

**Diode Characteristics**

Parameter	Symbol	Condition	Min.	Typ	Max.	Unit
Reverse Recovery Time	$t_{RR}$	$V_{DD} = 20\text{ V}, dIS/dt = 100\text{ A/s}, I_S = 30\text{ A}$		7.6		ns
Reverse Recovery Charge	$Q_{RR}$			2.5		ns

Note: ① Pulse Test : Pulse width  $\leq 300\mu\text{s}$ , Duty cycle  $\leq 2\%$  ;

② Device mounted on FR-4 substrate PC board, 2oz copper, with thermal bias to bottom layer 1inch square copper plate;

Fig.1 Gate-Charge Characteristics

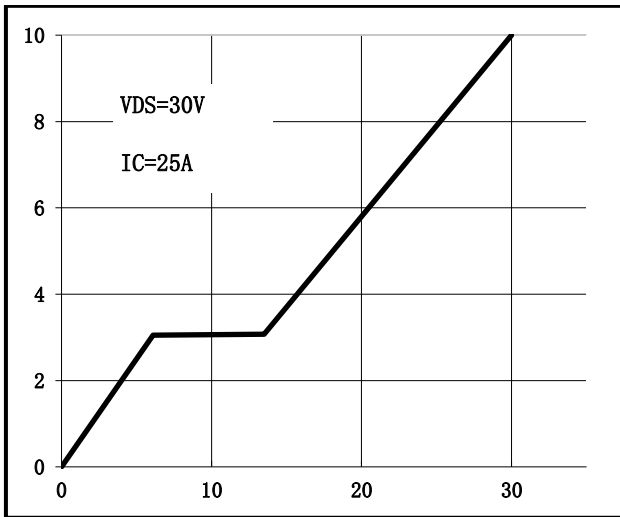


Fig.2 Capacitance Characteristics

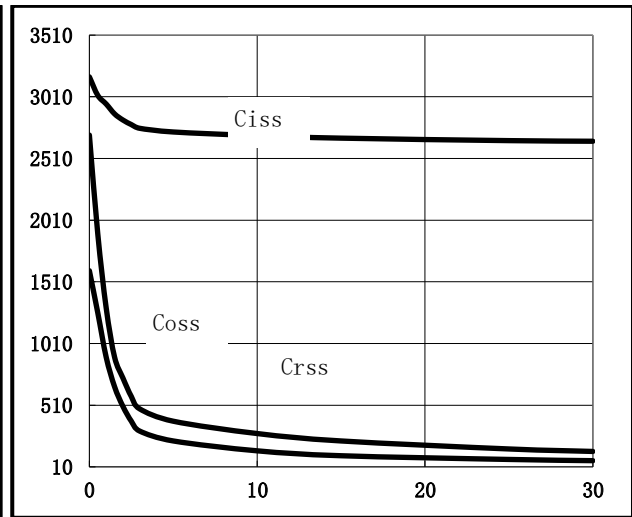


Fig.3 Power Dissipation

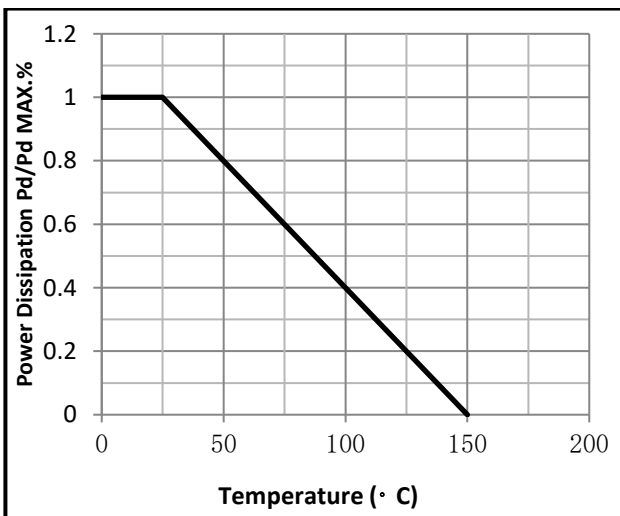


Fig.4 Typical output Characteristics

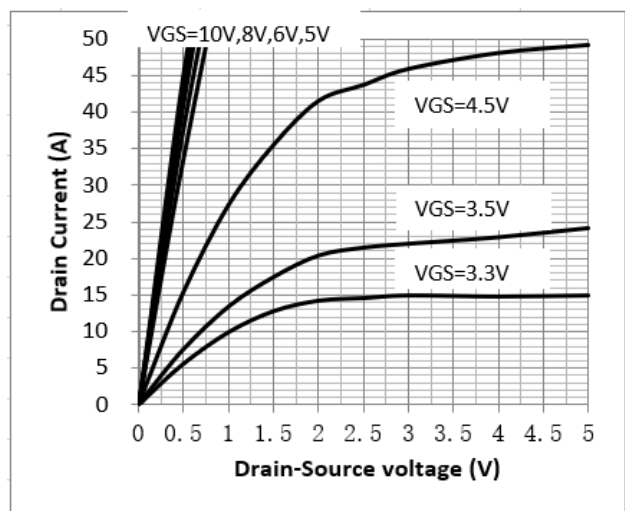


Fig.5 Threshold Voltage V.S Junction Temperature    Fig.6 Resistance V.S Drain Current

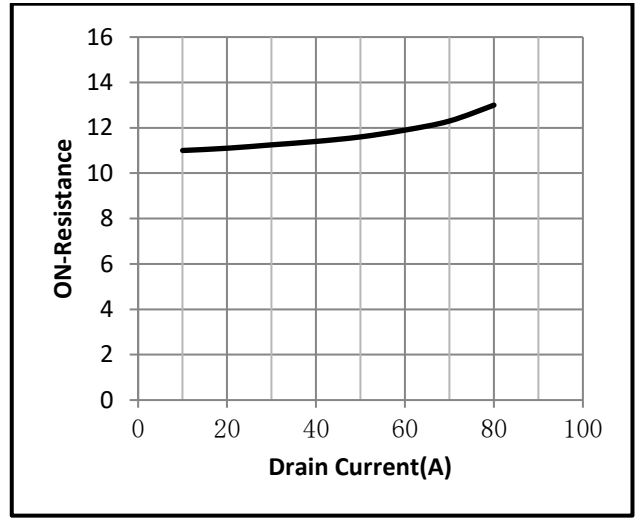
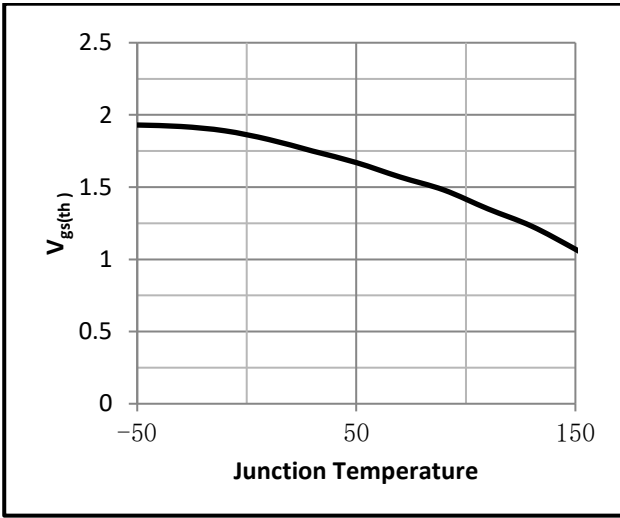


Fig.7 On-Resistance VS Gate Source Voltage

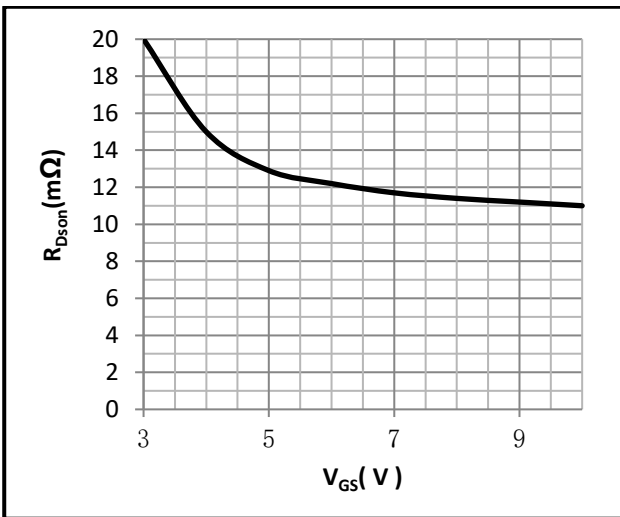


Fig.8 On-Resistance V.S Junction Temperature

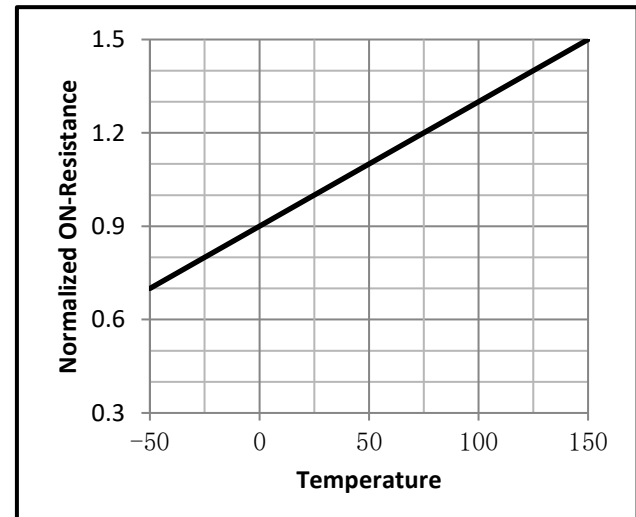


Fig.9 SOA Maximum Safe Operating Area

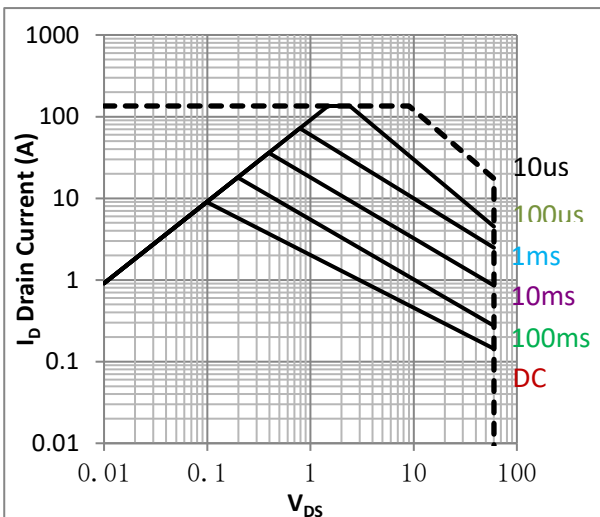


Fig.10 ID-Junction Temperature

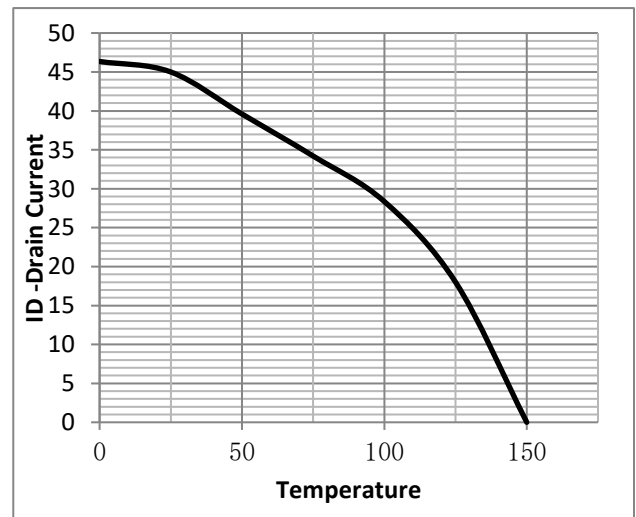


Figure 11. Diode Forward Voltage vs. Current

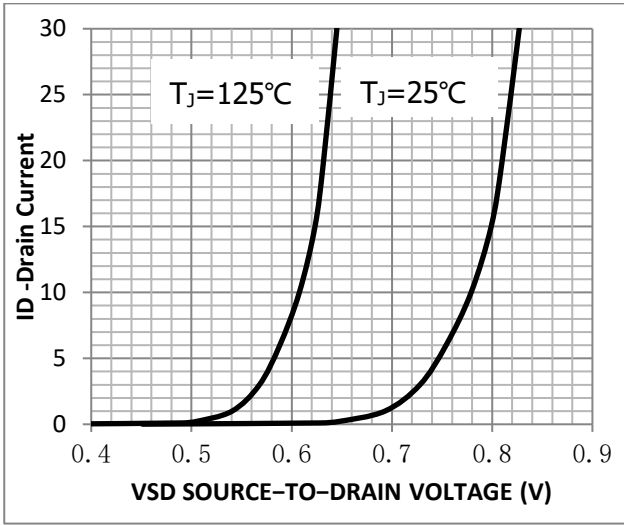


Figure 12. Transfer Characteristics

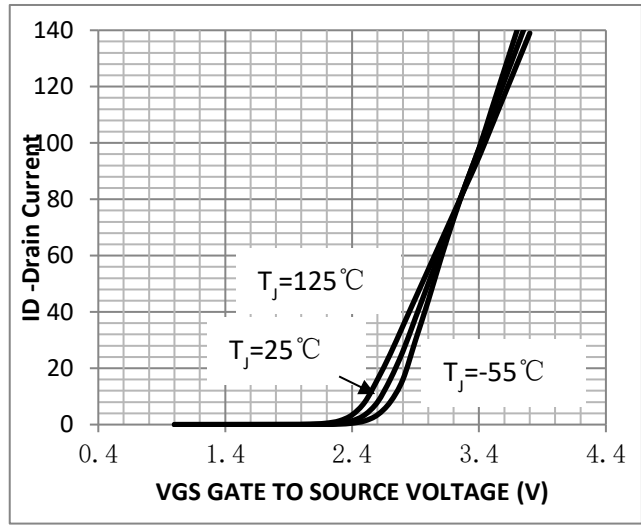


Fig.13 Switching Time Measurement Circuit

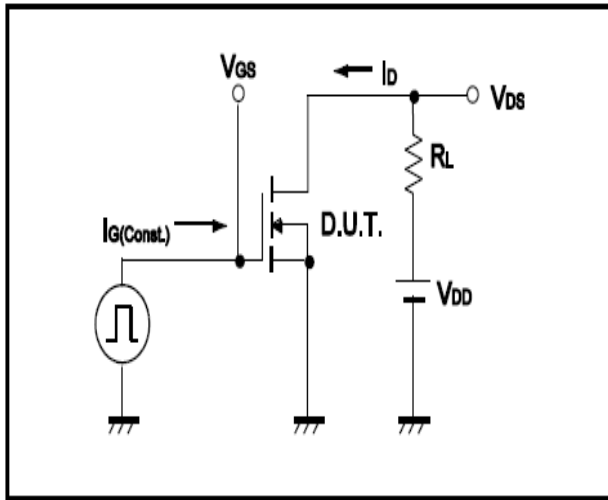


Fig.14 Gate Charge Waveform

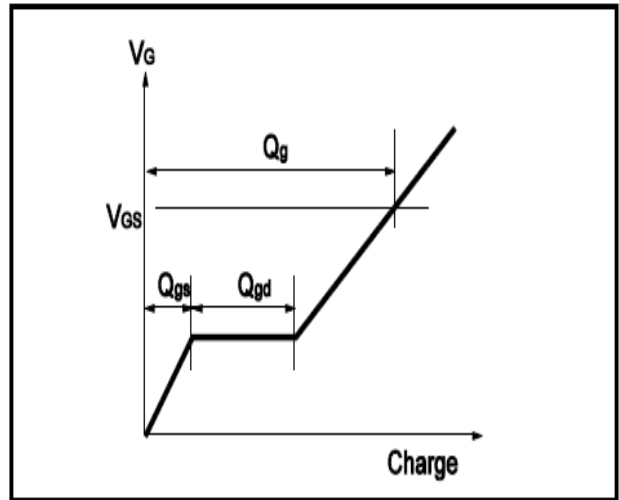


Fig.15 Switching Time Measurement Circuit

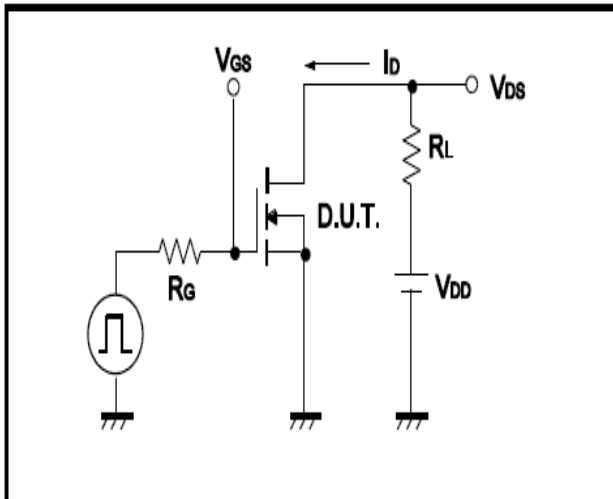


Fig.16 Gate Charge Waveform

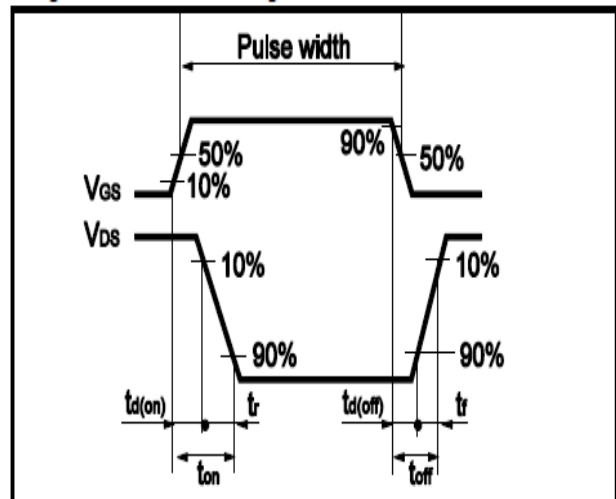


Fig.17 Avalanche Measurement Circuit

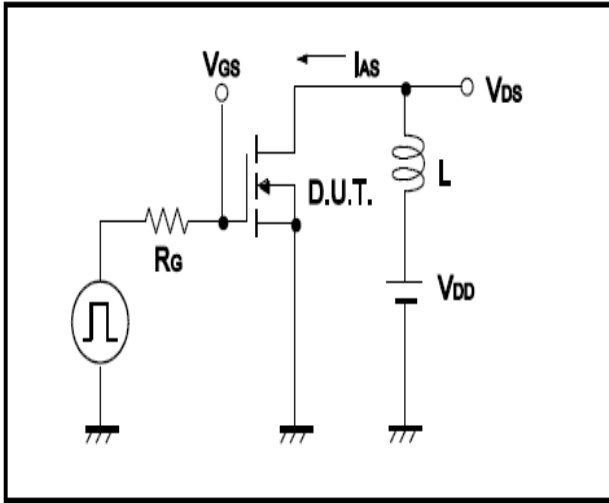
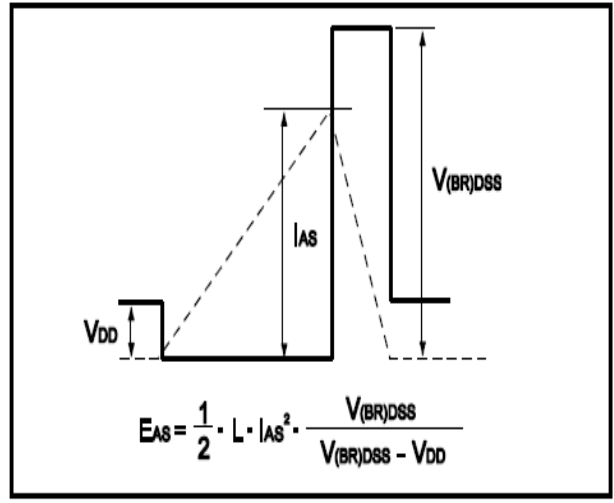
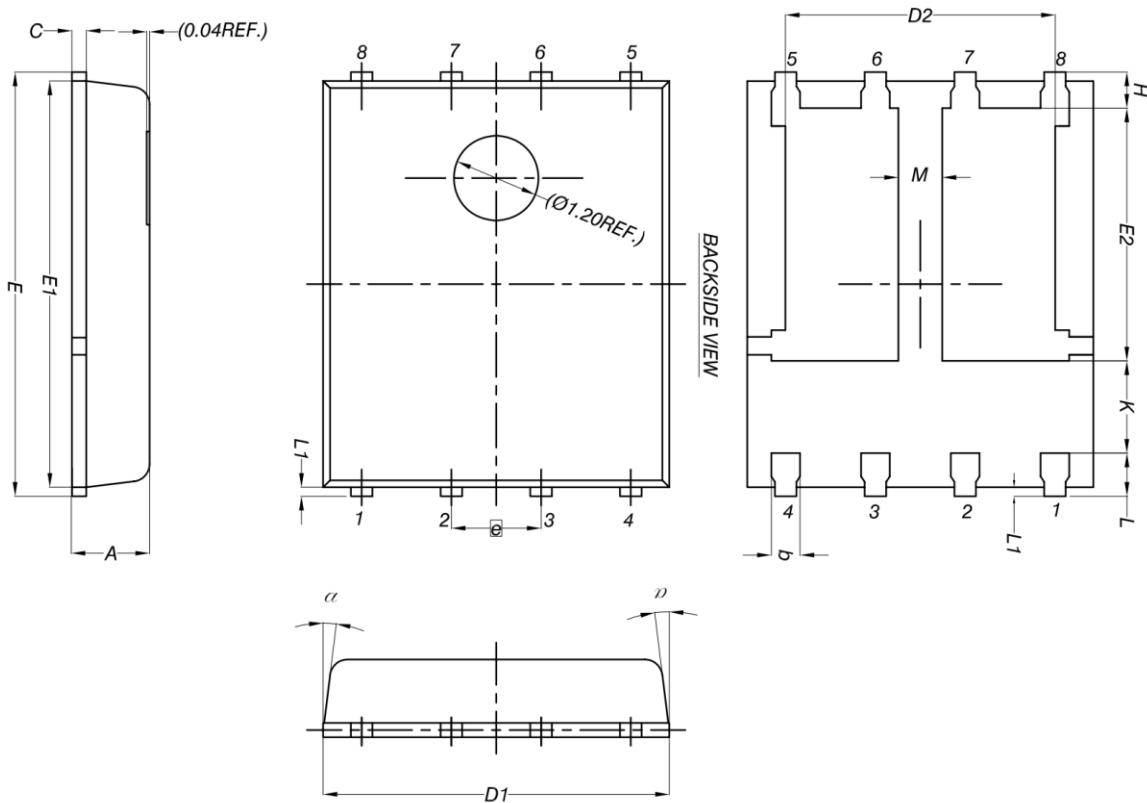


Fig.18 Avalanche Waveform



•Dimensions (DFN5×6)

Unit: mm



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
e	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°

