

General Description

It combines trench MOSFET technology with a low resistance package to provide extremely low $R_{DS(ON)}$. This device is ideal for load switch and battery protection applications.

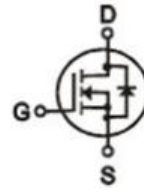
Features

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

Application

- MB/VGA Vcore
- SMPS 2nd Synchronous Rectifier
- POL application
- BLDC Motor driver

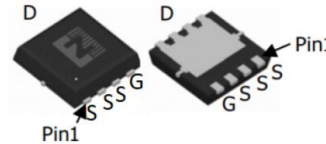
Product Summary



$V_{DS}=40V$

$R_{DS(ON)}=18m\Omega$

$I_D=25A$



DFN3 x 3

Ordering Information:

Part NO.	ZM160N04M
Marking	160N04
Packing Information	REEL TAPE
Basic ordering unit (pcs)	5000

Absolute Maximum Ratings ($T_C=25^{\circ}C$)

Parameter	Symbol	Rating	Unit
Drain-Source Voltage	V_{DS}	40	V
Gate-Source Voltage	V_{GS}	± 20	V
Continuous Drain Current	$I_{D@T_C=25^{\circ}C}$	25	A
	$I_{D@T_C=75^{\circ}C}$	19	A
	$I_{D@T_C=100^{\circ}C}$	15.7	A
Pulsed Drain Current ^①	I_{DM}	75	A
Total Power Dissipation	$P_{D@T_C=25^{\circ}C}$	42	W
Total Power Dissipation	$P_{D@T_A=25^{\circ}C}$	2.2	W
Operating Junction Temperature	T_J	-55 to 150	$^{\circ}C$
Storage Temperature	T_{STG}	-55 to 150	$^{\circ}C$

•Thermal resistance

Parameter	Symbol	Min.	Typ.	Max.	Unit
Thermal resistance, junction - case	R_{thJC}	-	-	3.0	°C/W
Thermal resistance, junction - ambient	R_{thJA}	-	-	55	°C/W
Soldering temperature, wave soldering for 10s	T_{sold}	-	-	265	°C

•Electronic Characteristics

Parameter	Symbol	Condition	Min.	Typ	Max.	Unit
Drain-Source Breakdown Voltage	BV_{DSS}	$V_{GS}=0V, I_D=250\mu A$	40			V
Gate Threshold Voltage	$V_{GS(TH)}$	$V_{GS}=V_{DS}, I_D=250\mu A$	1.2		2.5	V
Drain-Source Leakage Current	I_{DSS}	$V_{DS}=40V, V_{GS}=0V$			1.0	μA
Gate- Source Leakage Current	I_{GSS}	$V_{GS}=\pm 20V, V_{DS}=0V$			± 100	nA
Static Drain-source On Resistance	$R_{DS(ON)}$	$V_{GS}=10V, I_D=10A$		18	23	m Ω
		$V_{GS}=4.5V, I_D=10A$		26	34	m Ω
Forward Trans conductance	g_{FS}	$V_{DS}=10V, I_D=10A$		4.5		S
Source-drain voltage	V_{SD}	$I_S=10A$			1.28	V

•Dynamic Characteristics

Parameter	Symbol	Condition	Min.	Typ	Max.	Unit
Input capacitance	C_{iss}	$V_{GS}=0V, V_{DS}=25V$ $f = 1MHz$	-	805	-	pF
Output capacitance	C_{oss}		-	94	-	
Reverse transfer capacitance	C_{rss}		-	58	-	
Total gate charge	Q_g	$V_{DD}=25V$ $I_D=8A$ $V_{GS}=10V$	-	12	-	nC
Gate - Source charge	Q_{gs}		-	3.1	-	
Gate - Drain charge	Q_{gd}		-	2.8	-	
Turn-ON Delay time	$t_{D(on)}$	$V_{GS}=10V, V_{DS}=15V$ $R_G=3\Omega, R_L=2.5\Omega$		3		ns
Turn-ON Rise time	t_r			4		ns
Turn-Off Delay time	$t_{D(off)}$			15		ns
Turn-Off Fall time	t_f			2		ns
Reverse Recovery Time	t_{RR}	$V_{DD}=20V, dI_S/dt = 100 A/\mu s, I_S=8A$		12		ns
Reverse Recovery Charge	Q_{RR}			3.5		nC

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

Fig.1 Power Dissipation

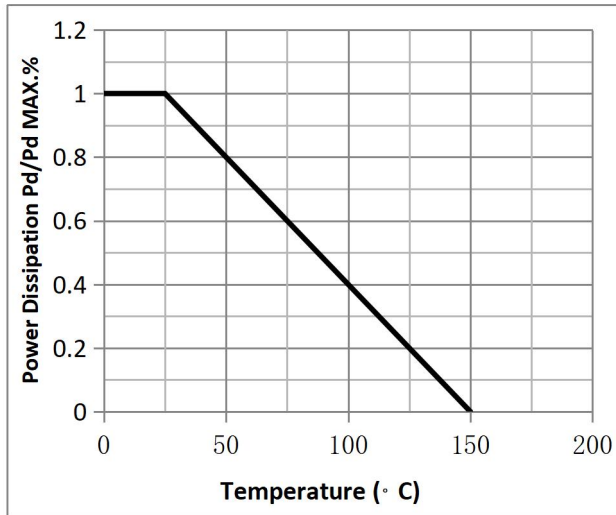


Fig.2 Typical output Characteristics

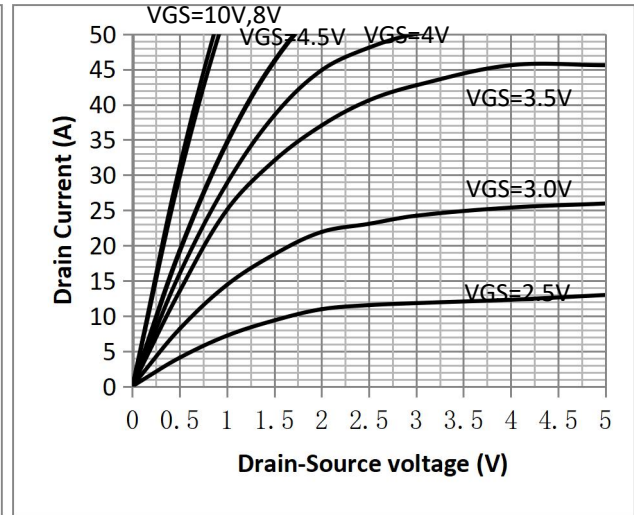


Fig.3 Gate-Charge Characteristics

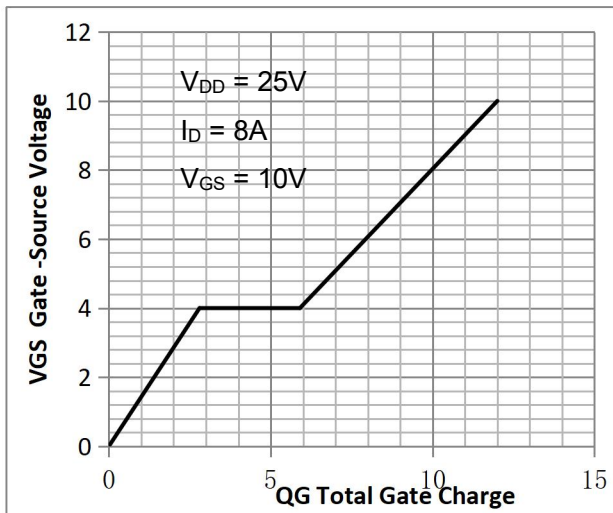


Fig.4 Capacitance Characteristics

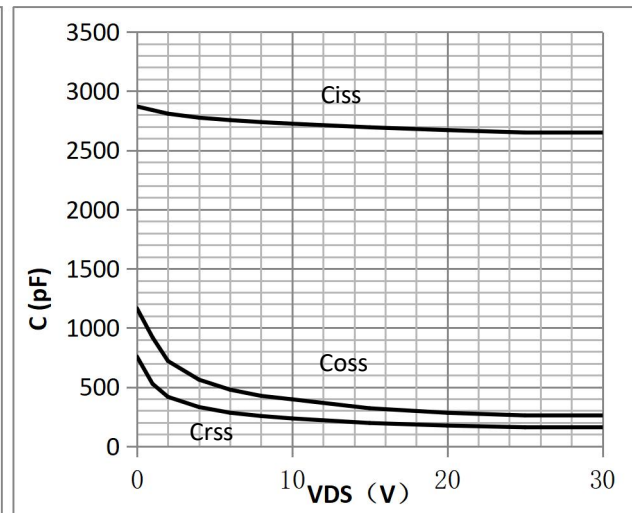


Fig.5 Threshold Voltage V.S Junction Temperature

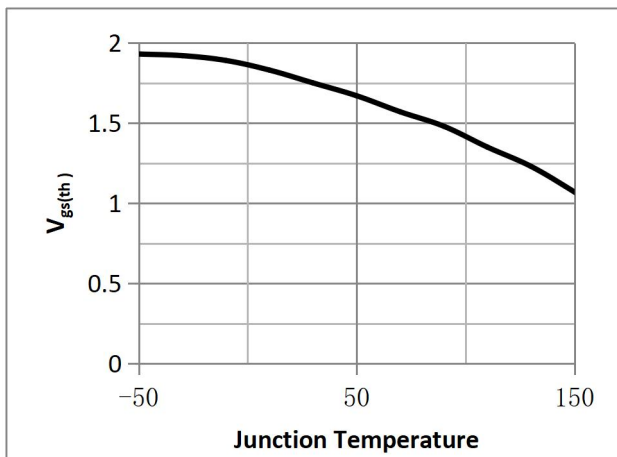


Fig.6 Resistance V.S Drain Current

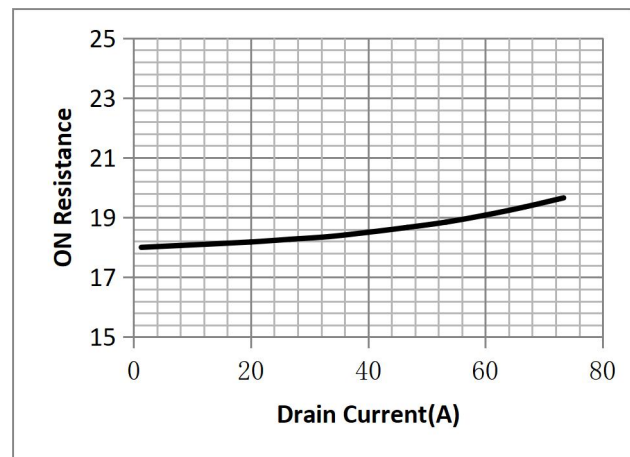


Fig.7 On-Resistance VS Gate Source Voltage

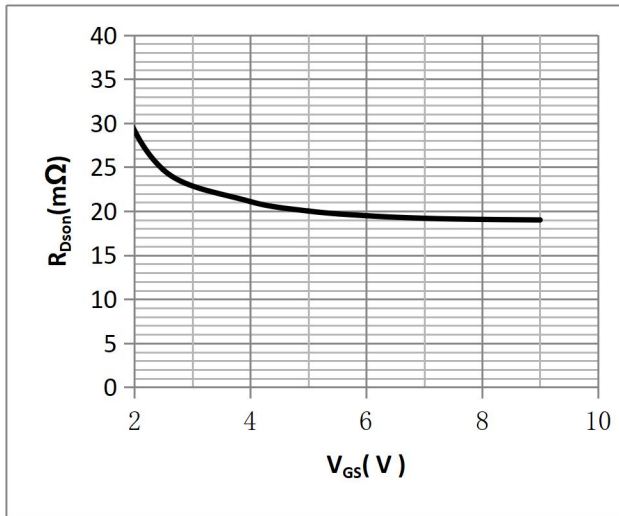


Fig.8 On-Resistance V.S Junction Temperature

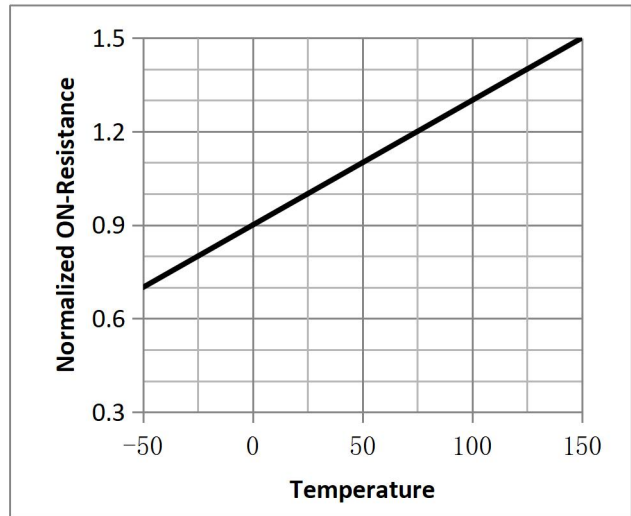


Fig.9 SOA Maximum Safe Operating Area

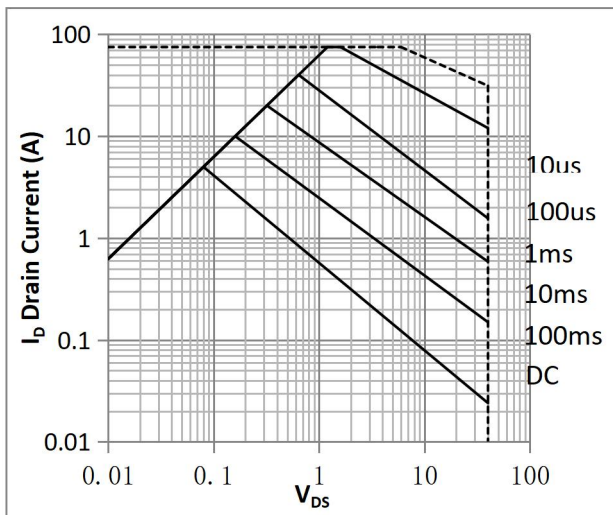


Fig.10 I_D -Junction Temperature

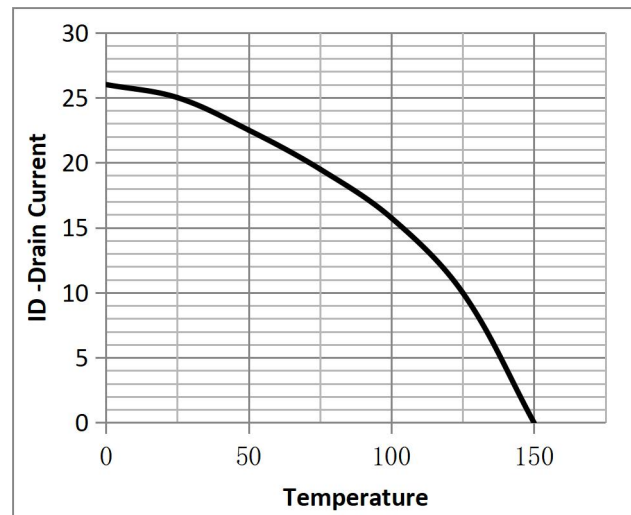


Figure.11 Diode Forward Voltage vs. Current

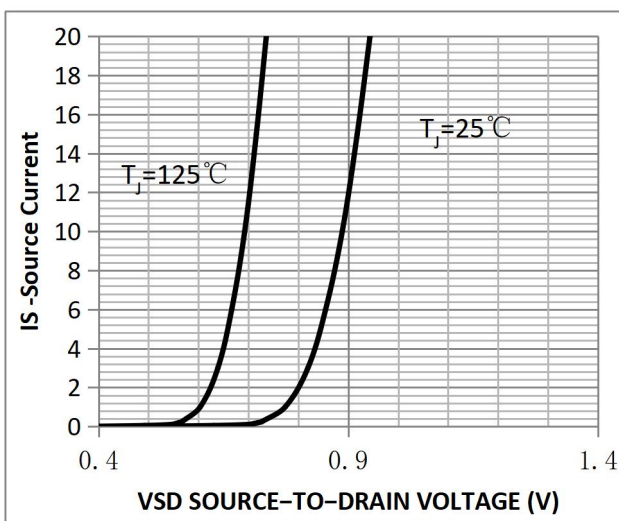


Figure.12 Transfer Characteristics

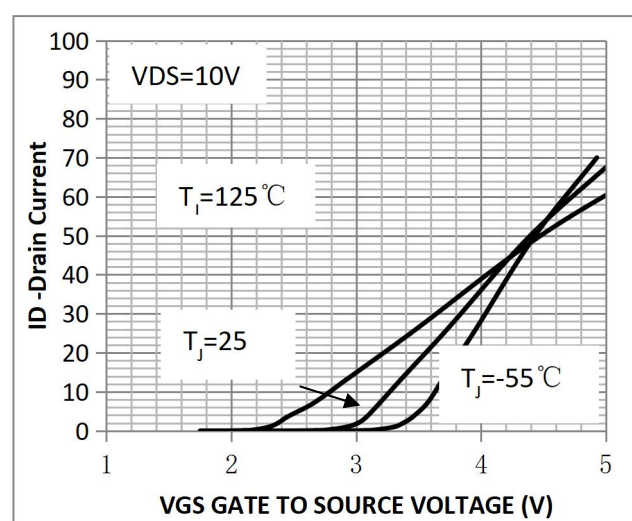


Fig.13 Switching Time Measurement Circuit

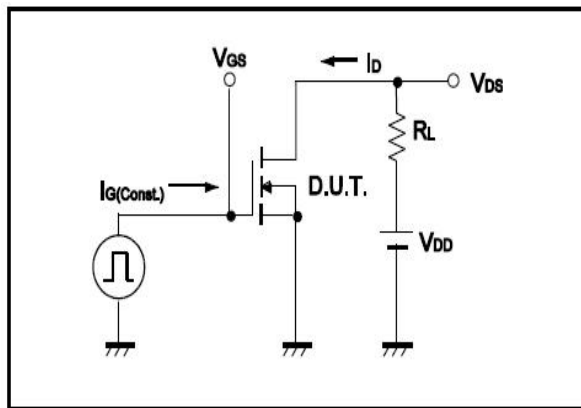


Fig.14 Gate Charge Waveform

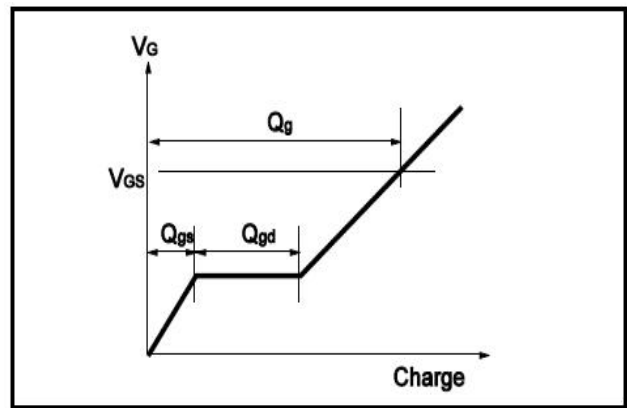


Fig.15 Switching Time Measurement Circuit

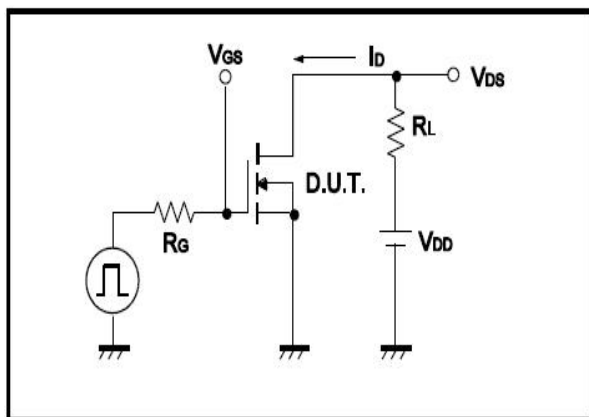


Fig.16 Gate Charge Waveform

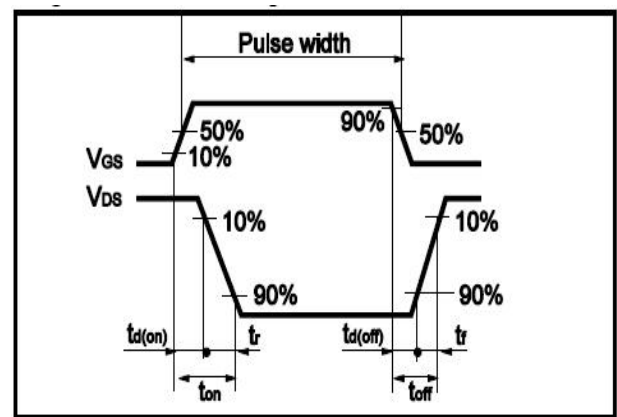


Fig.17 Avalanche Measurement Circuit

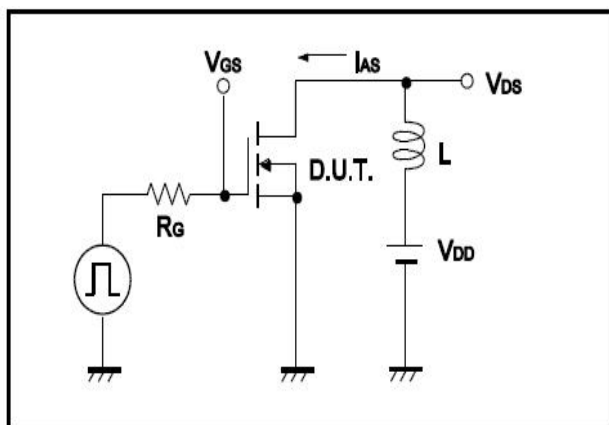
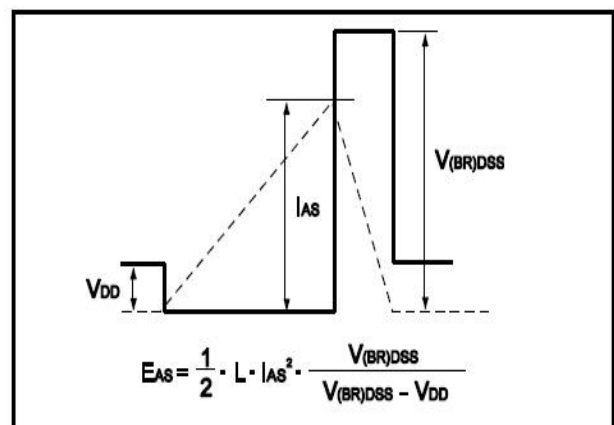
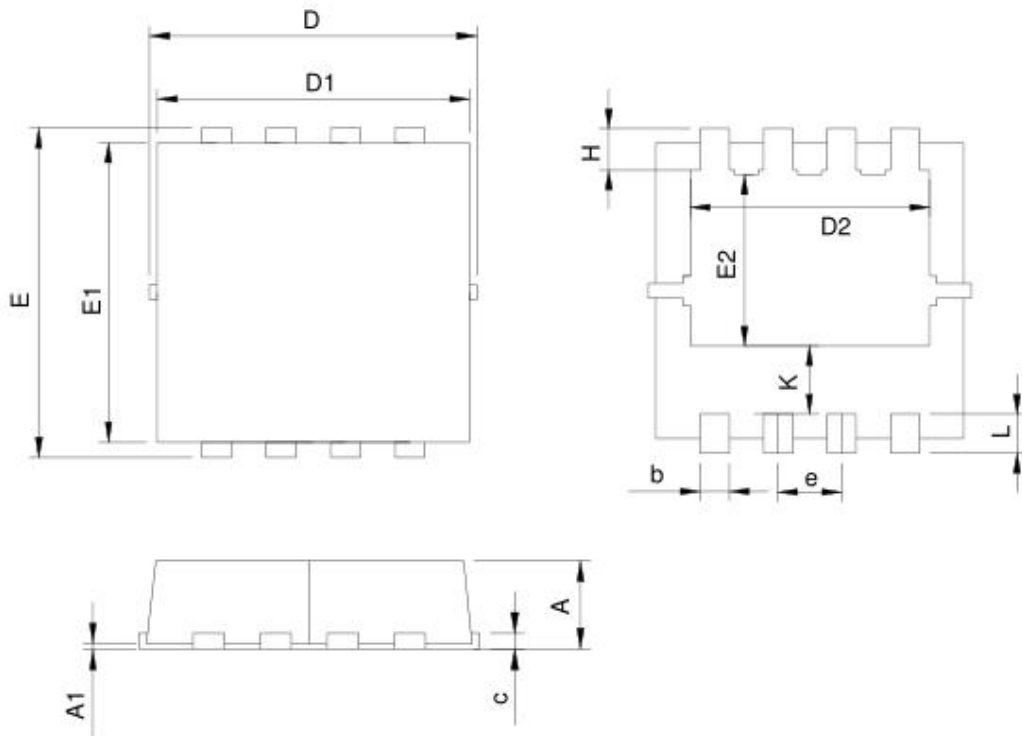


Fig.18 Avalanche Waveform



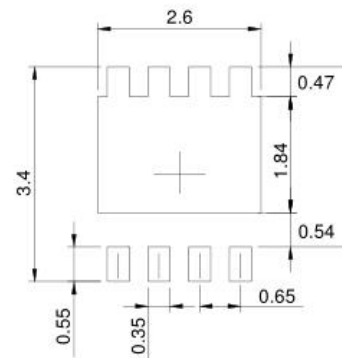
•Dimensions(DFN3×3)

Unit: mm



SYMBOL	DFN3.3x3.3-8			
	MILLIMETERS		INCHES	
	MIN.	MAX.	MIN.	MAX.
A	0.70	1.00	0.028	0.039
A1	0.00	0.05	0.000	0.002
b	0.25	0.35	0.010	0.014
c	0.14	0.20	0.006	0.008
D	3.10	3.50	0.122	0.138
D1	3.05	3.25	0.120	0.128
D2	2.35	2.55	0.093	0.100
E	3.10	3.50	0.122	0.138
E1	2.90	3.10	0.114	0.122
E2	1.64	1.84	0.065	0.072
e	0.65 BSC		0.026 BSC	
H	0.32	0.52	0.013	0.020
K	0.59	0.79	0.023	0.031
L	0.25	0.55	0.010	0.022

RECOMMENDED LAND PATTERN



UNIT: mm