

• General Description

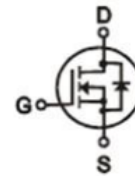
It combines advanced trench MOSFET technology with a low resistance package to provide extremely low $R_{DS(ON)}$. This device is ideal for load switch and battery protection applications.

• 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

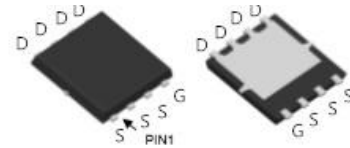
- MB/VGA Vcore
- SMPS 2nd Synchronous Rectifier
- POL application
- BLDC Motor driver

• Product Summary


$V_{DS} = 20V$

$R_{DS(ON)} = 2.8m\Omega$

$I_D = 65A$


DFN3 x 3
• Ordering Information:

Part NO.	ZM028N02M
Marking	028N02
Packing Information	REEL TAPE
Basic ordering unit (pcs)	5000

• Absolute Maximum Ratings (T_c =25°C)

Parameter	Symbol	Rating	Unit
Drain-Source Voltage	V_{DS}	20	V
Gate-Source Voltage	V_{GS}	±12	V
Continuous Drain Current	$I_D@TC=25^\circ C$	65	A
	$I_D@TC=75^\circ C$	49	A
	$I_D@TC=100^\circ C$	41	A
Pulsed Drain Current ^①	I_{DM}	195	A
Total Power Dissipation	$P_D@TC=25^\circ C$	48	W
Total Power Dissipation	$P_D@TA=25^\circ C$	2.3	W
Operating Junction Temperature	T_J	-55 to 150	°C
Storage Temperature	T_{STG}	-55 to 150	°C
Single Pulse Avalanche Energy@L=0.1mH	E_{AS}	150	mJ

•Thermal resistance

Parameter	Symbol	Min.	Typ.	Max.	Unit
Thermal resistance, junction - case	R _{thJC}	-	-	2.8	° C/W
Thermal resistance, junction - ambient	R _{thJA}	-	-	53	° C/W
Soldering temperature, wavesoldering 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 =250uA	20			V
Gate Threshold Voltage	V _{GS(TH)}	V _{GS} =V _{DS} , I _D =250uA	0.5	0.8	1.5	V
Drain-Source Leakage Current	I _{DSS}	V _{DS} =20V, V _{GS} =0V			1.0	uA
Gate- Source Leakage Current	I _{GSS}	V _{GS} =±12V, V _{DS} =0V			±100	nA
Static Drain-source On Resistance	R _{DS(ON)}	V _{GS} =4.5V, I _D =20A		2.8	3.6	mΩ
		V _{GS} =2.5V, I _D =10A		4	5.2	mΩ
Forward Transconductance	g _{FS}	V _{DS} =15V, I _D =10A		16		s

•Dynamic Characteristics

Parameter	Symbol	Condition	Min.	Typ	Max.	Unit
Input capacitance	C _{iss}	f = 1MHz, V _{DS} =25V	-	3200	-	pF
Output capacitance	C _{oss}		-	430	-	
Reverse transfer capacitance	C _{rss}		-	290	-	
Gate Resistance	R _g	f = 1MHz		2.5		Ω
Total gate charge	Q _g	V _{DD} = 5V I _D = 5A V _{GS} = 10V	-	32	-	nC
Gate - Source charge	Q _{gs}		-	9.6	-	
Gate - Drain charge	Q _{gd}		-	15	-	
Turn-ON Delay time	t _{D(on)}	V _{GS} =10V, V _{DS} =15V R _G =6Ω, I _D =15A		19		ns
Turn-ON Rise time	t _r			13		ns
Turn-Off Delay time	t _{D(off)}			46		ns
Turn-Off Fall time	t _f			14		ns
Reverse Recovery Time	t _{RR}		V _{DD} = 20 V, dI _S /dt = 100 A/s, I _S = 30 A		5.8	
Charge Time	t _a			3.4		ns
Discharge Time	t _b			2.4		ns

Reverse Recovery Charge	Q_{RR}		1.6	nC
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Note: ① Pulse Test : Pulse width $\leq 300\mu s$, Duty cycle $\leq 2\%$;

Fig.1 Power Dissipation

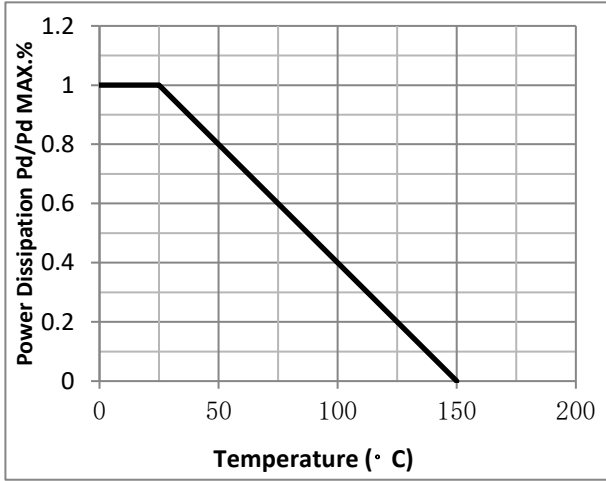


Figure 9. Diode Forward Voltage vs. Current

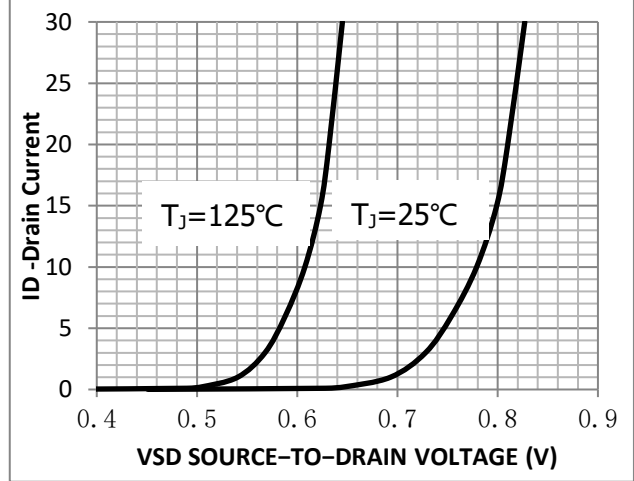


Fig.3 Threshold Voltage V.S Junction Temperature

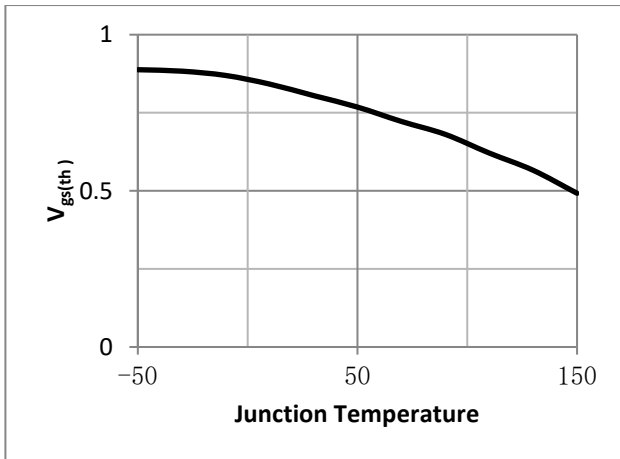


Fig.4 Resistance V.S Drain Current

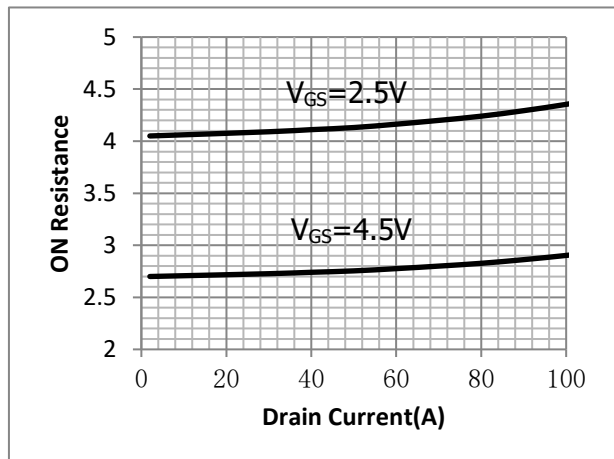


Fig.5 On-Resistance VS Gate Source Voltage

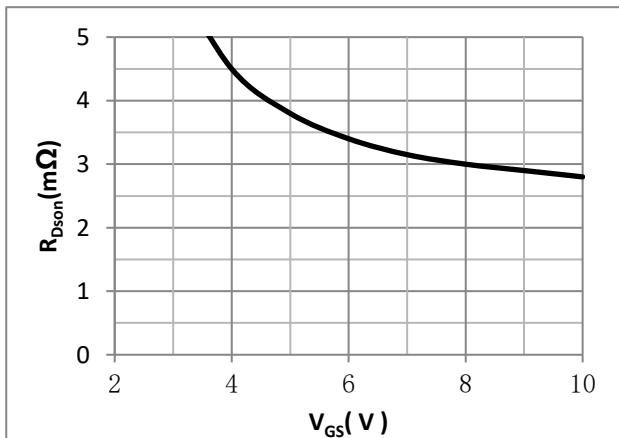


Fig.6 On-Resistance V.S Junction Temperature

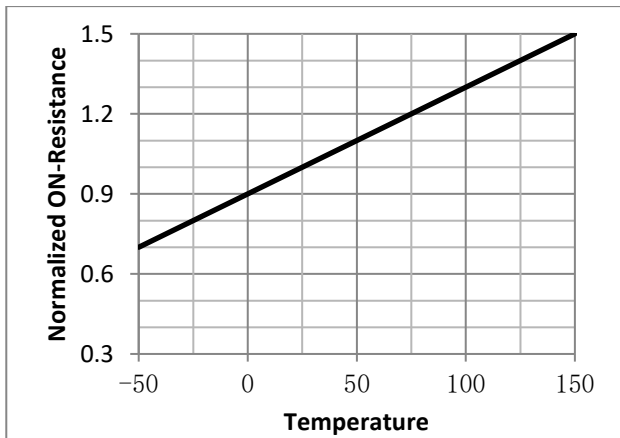


Fig.7 SOA Maximum Safe Operating Area

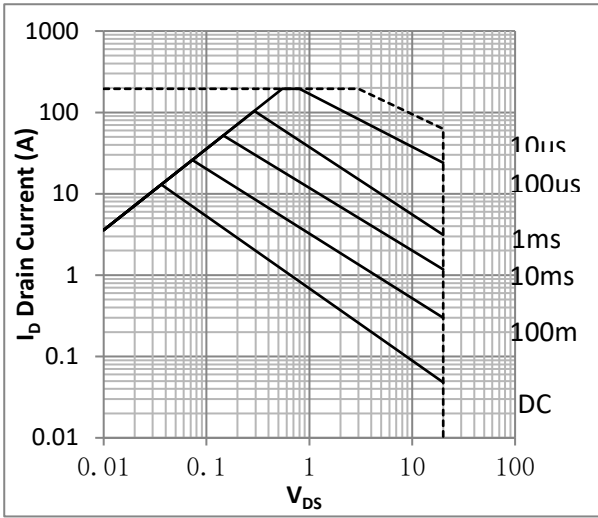


Fig.8 ID-Junction Temperature

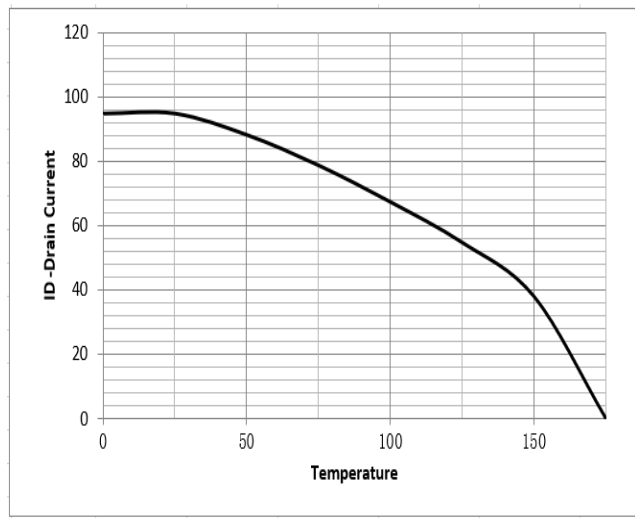


Figure 9. Gate-to-Source and Drain-to-Source Voltage vs. Total Charge

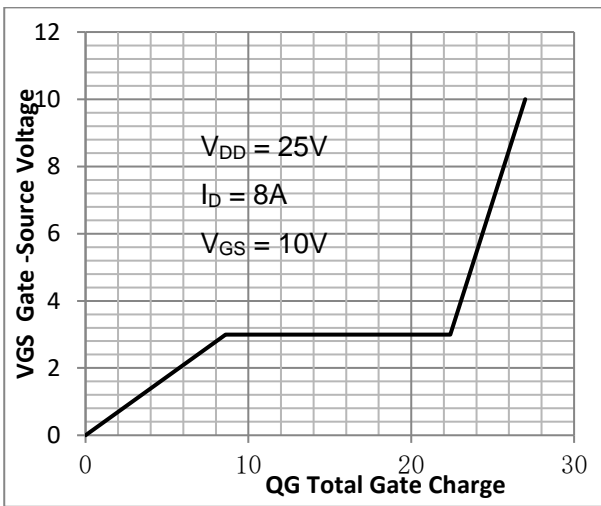


Fig.10 Capacitance Variation

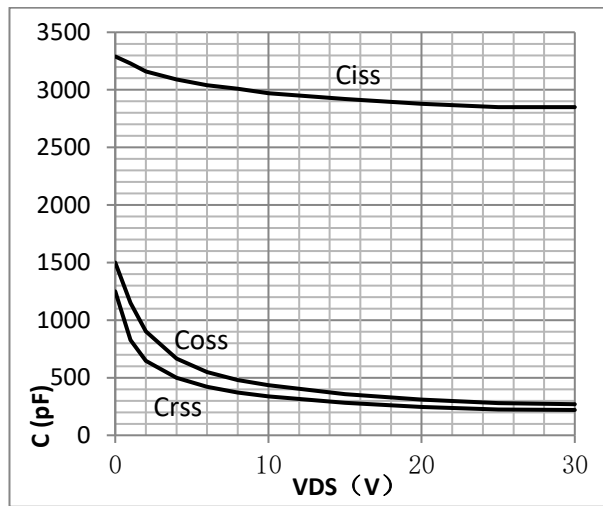


Fig.11 Normalized Maximum Transient Thermal Impedance

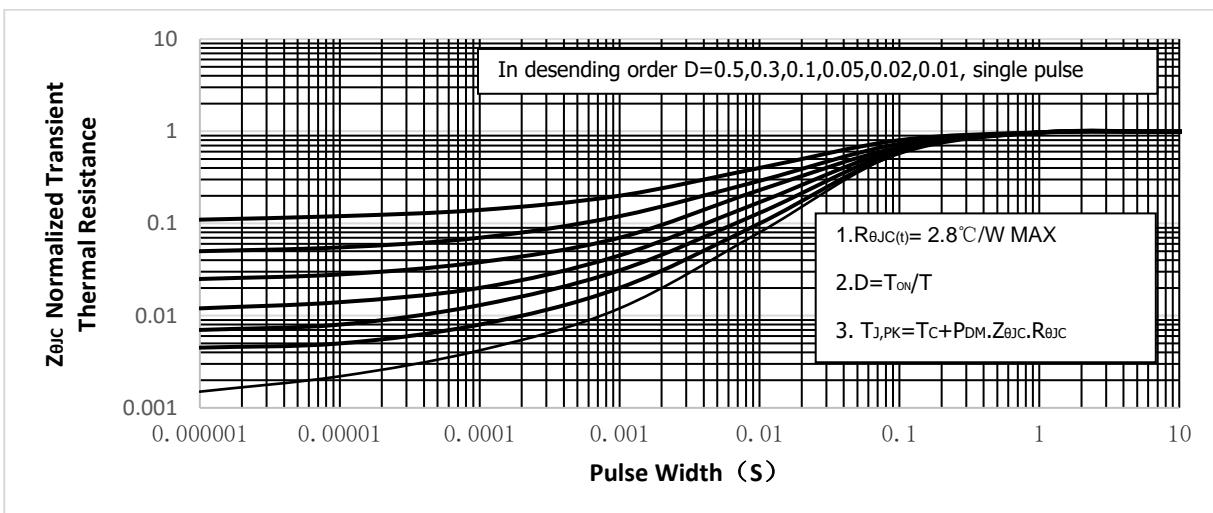


Fig.12 Switching Time Measurement Circuit

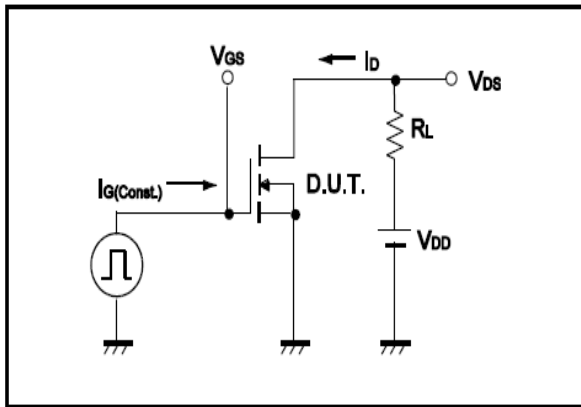


Fig.13 Gate Charge Waveform

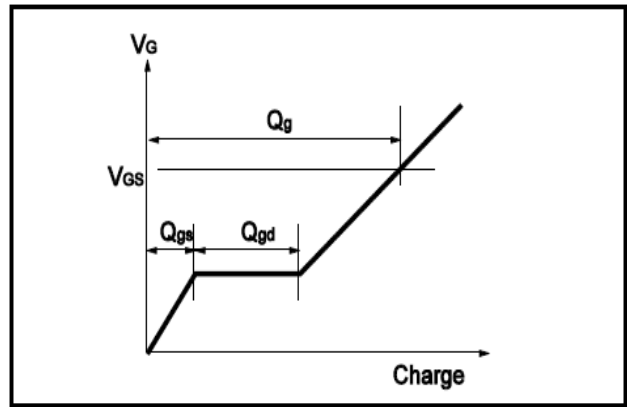


Fig.14 Switching Time Measurement Circuit

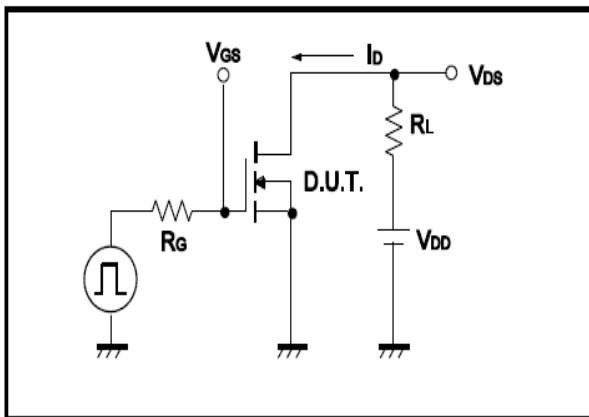


Fig.15 Gate Charge Waveform

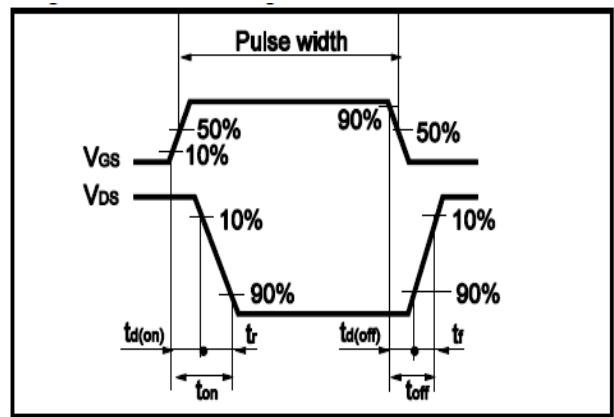


Fig.16 Avalanche Measurement Circuit

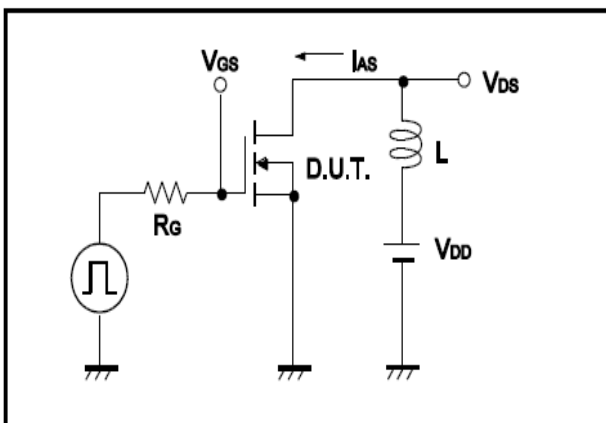
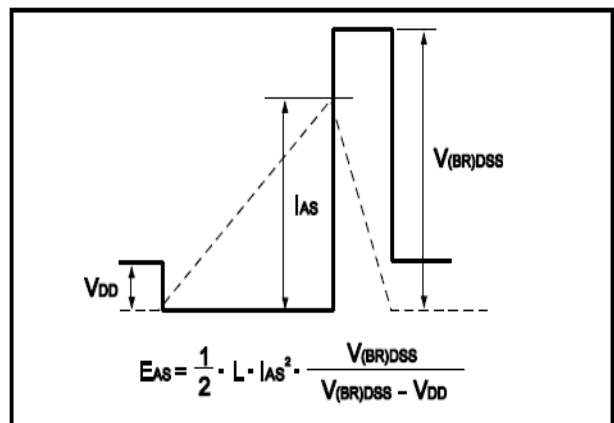


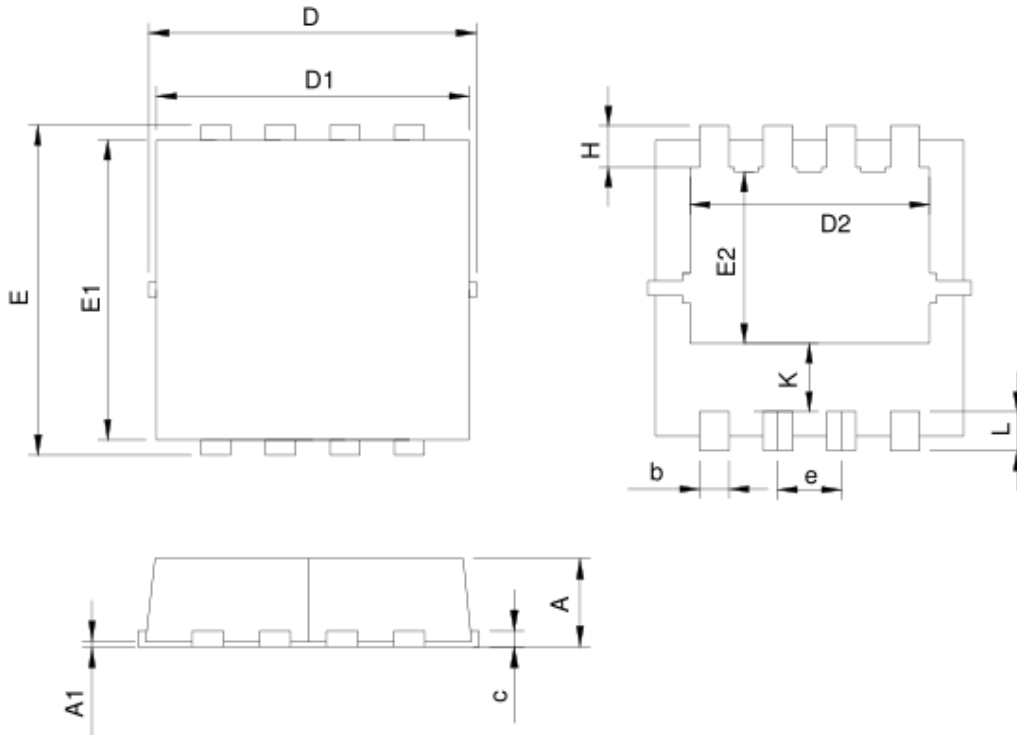
Fig.17 Avalanche Waveform





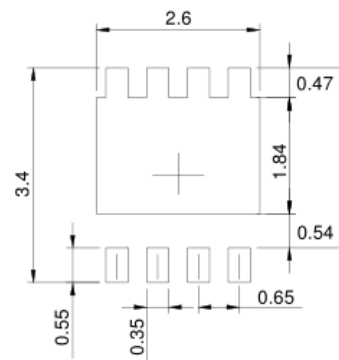
•Dimensions (DFN3*3)

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