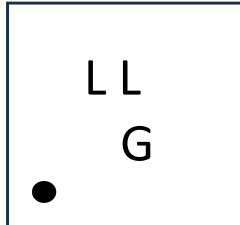


Dual N-channel Power MOSFET:
12V, 28mohm, 4.5A

Product Summary			
VSSS	VGSS	RSS(ON) TYP/MAX	IS MAX
12V	± 8V	28/38 mΩ@VGS=4.5V	4.5A
		29/40 mΩ@VGS=3.8V	
		33/54 mΩ@VGS=3.1V	
		38/74 mΩ@VGS=2.5V	

Marking Symbol Code

- ❖ Laser Marking Device Code: Only Lot code



L : LOT Code
G : Gostone (fixed)
● : Pin#1 Identifier

Form

- ❖ Tape & Reel Embossed Type: 5,000pcs / reel

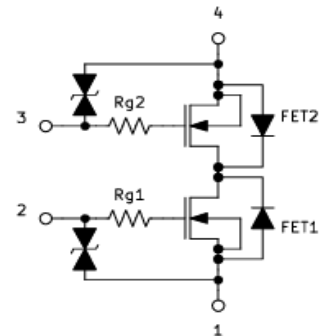
Features

- ❖ CSP (Chip Size Package)
- ❖ Halogen-Free / RoHS Compliant
- ❖ 2.5V Drive Low Source-Source On-State Resistance
- ❖ Gate Resistor Installed Common-Drain Type MOSFET
- ❖ ESD Protection Diode Installed (Gate-Source)

Application

- ❖ Lithium-Ion Secondary Battery Protection Circuits

Equivalent circuit



Absolute Maximum Rating Ta=25°C				
Parameter	Symbol	Rating	Unit	
Source to Source Voltage	VSS	12	V	
Gate to Source Voltage	VGS	±8	V	
Source Current	DC	IS1 ^{*1}	3.0	A
	DC	IS2 ^{*2}	4.5	A
	Pulse	ISP ^{*2*3}	25.0	A
Total Dissipation	DC	PD1 ^{*1}	0.38	W
	DC	PD2 ^{*2}	0.90	W
Junction Temperature	TJ	150	°C	
Storage Temperature	Tstg	-55 to +150	°C	

Thermal Characteristics Ta = 25°C			
Parameter	Symbol	Rating	Unit
Thermal Resistance	Rth ^{*1}	330	°C/W
	Rth ^{*2}	135	°C/W

Note *1 Mounted on FR4 board (25.4mm x 25.4mm x t1.0mm)

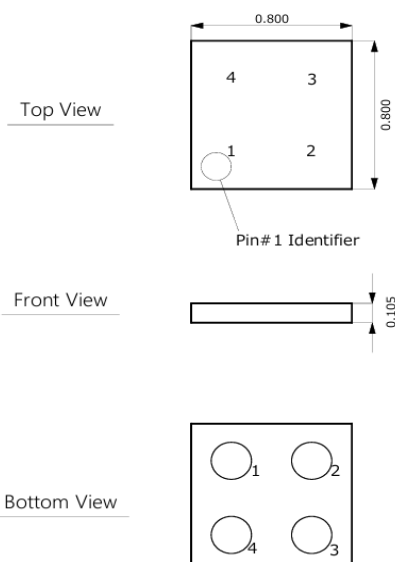
with minimum copper pad (44.6mm², 36μm thickness copper)

Note *2 Mounted on FR4 board (25.4mm x 25.4mm x t1.0mm)

with maximum copper pad (617.5mm², 36μm thickness copper)

Note *3 t=10μs, duty cycle ≤ 1%

(Unit: mm)



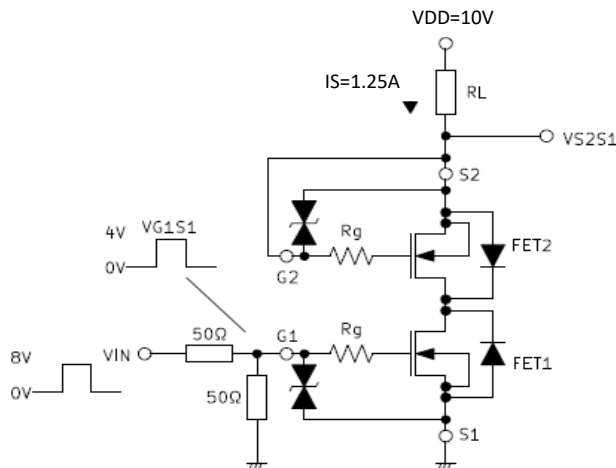
FET1: 1: Source1, 2: Gate1
FET2: 4: Source2, 3: Gate2

Electrical Characteristics (Ta=25°C +/- 3°C)

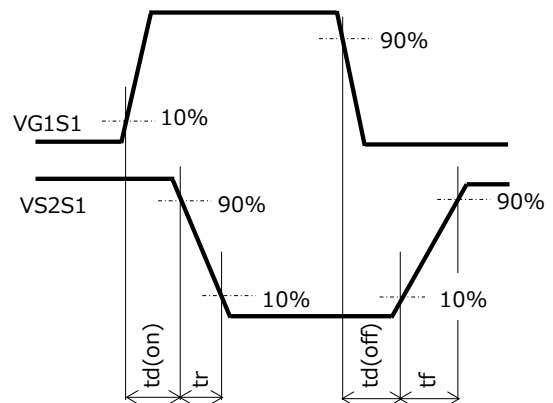
Parameter	Symbol	Conditions	Min	Typ	Max	Unit
Source-Source Breakdown Voltage	VSSS	IS=1mA, VGS=0V	12			V
Zero Gate Voltage Source Current	ISSS	VSS=12V, VGS=0V			1.0	μA
Gate-Source Leakage Current	IGSS	VGS=±8V, VSS=0V			±10.0	μA
		VGS=±5V, VSS=0V			±1.0	μA
Gate-Source Threshold Voltage	Vth	VSS=10V, IS=0.07mA	0.35	0.85	1.40	V
Source-Source On-State Resistance	RSS(on)1	IS=1.25A, VGS=4.5V	19	28	38	mΩ
	RSS(on)2	IS=1.25A, VGS=3.8V	20	29	40	
	RSS(on)3	IS=1.25A, VGS=3.1V	21	33	54	
	RSS(on)4	IS=1.25A, VGS=2.5V	22	38	74	
Body Diode Forward Voltage	VF(S-S)	IF=1.25A, VGS=0V		0.67	1.2	V
Input Capacitance ^{*1}	Ciss	VSS=10V, VGS=0V, f=1kHz		290		pF
Output Capacitance ^{*1}	Coss			70		
Reverse Transfer Capacitance ^{*1}	Crss			53		
Turn-On Delay Time ^{*1*2}	td(on)	VDD=10V, VGS=0 to 4.0V, IS=1.25A		0.04		μs
Rise Time ^{*1*2}	tr			0.11		
Turn-Off Delay Time ^{*1*2}	td(off)	VDD=10V, VGS=4.0 to 0V, IS=1.25A		0.37		μs
Fall Time ^{*1*2}	tf			0.33		
Total Gate Charge ^{*1}	Qg	VDD=10V, VGS=0 to 4.0V, IS=1.25A		3.8		nC
Gate-Source Charge ^{*1}	Qgs			0.5		
Gate-Drain Charge ^{*1}	Qgd			1.5		
Gate Resistance ^{*1}	Rg	f=1MHz		615		Ω

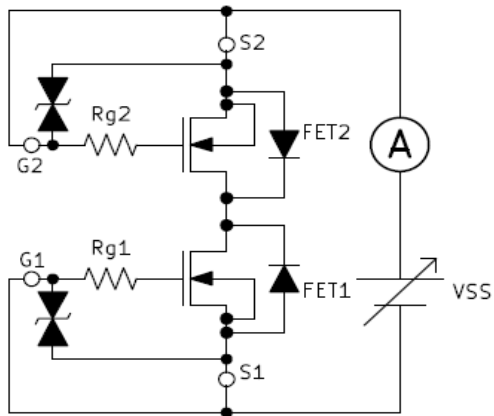
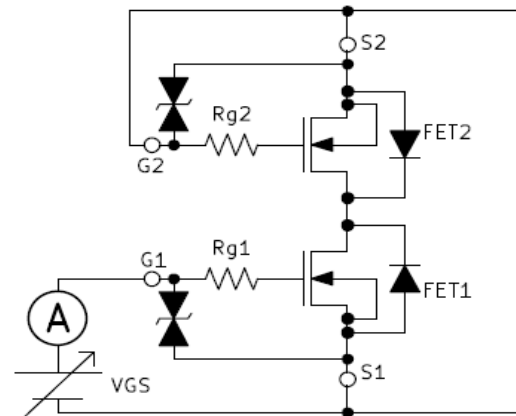
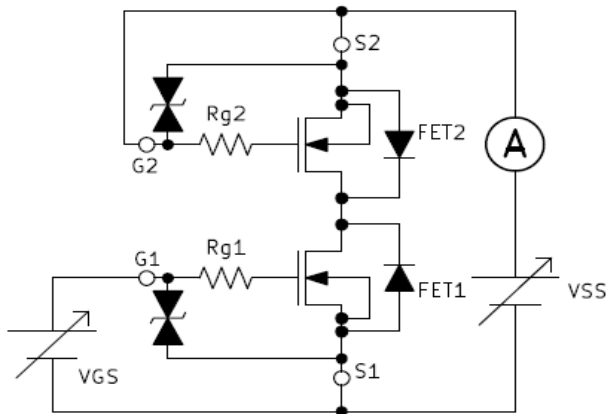
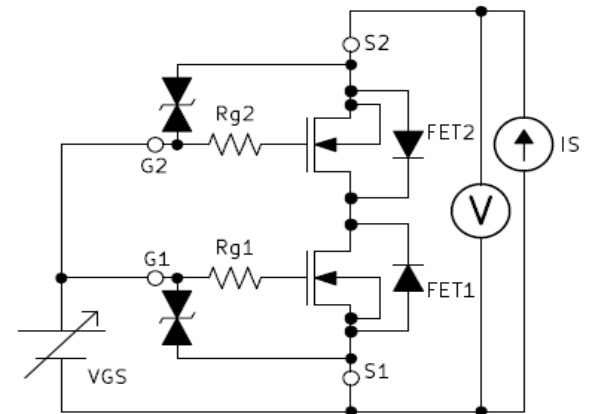
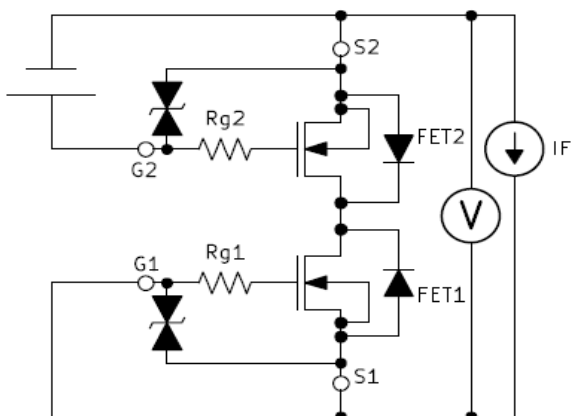
Note *1 Guaranteed by Design

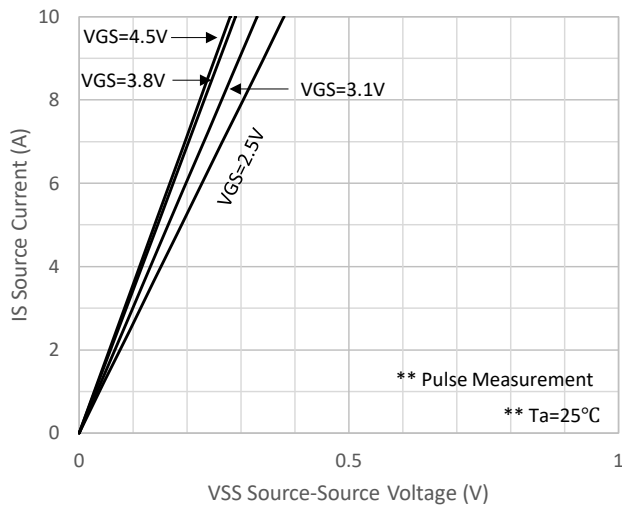
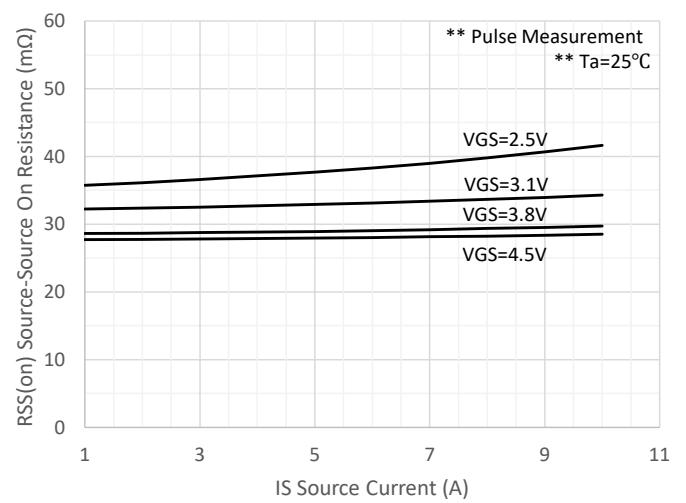
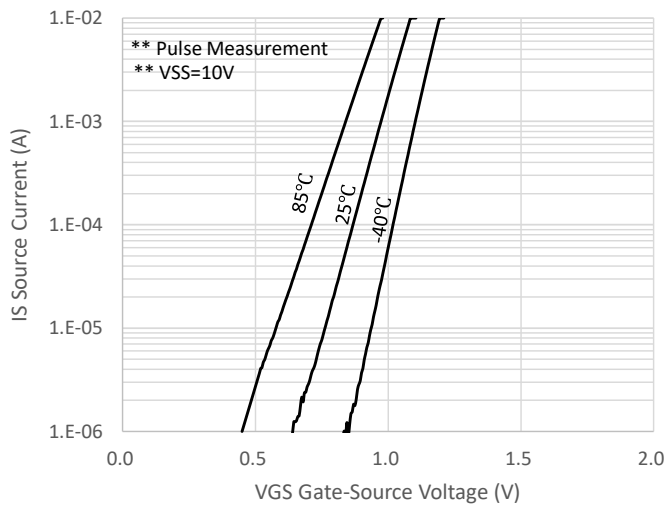
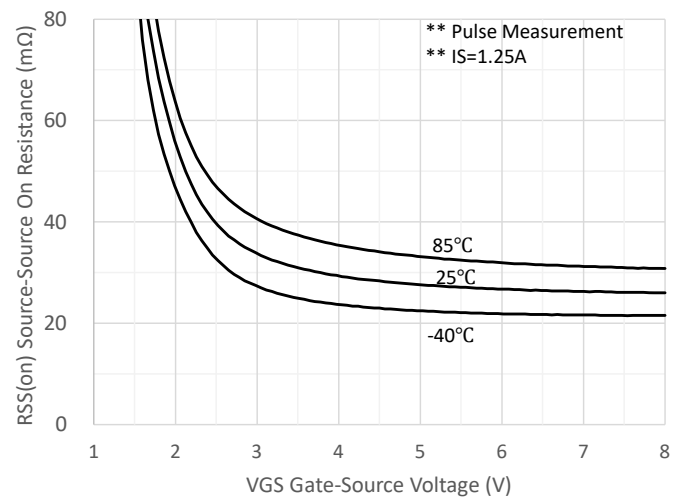
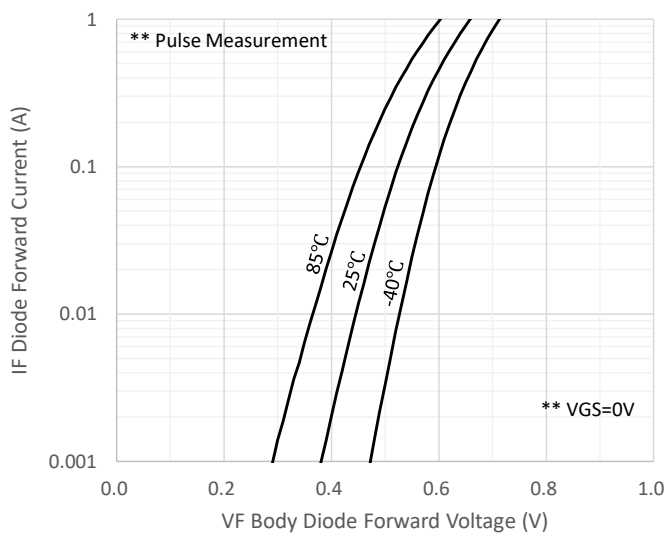
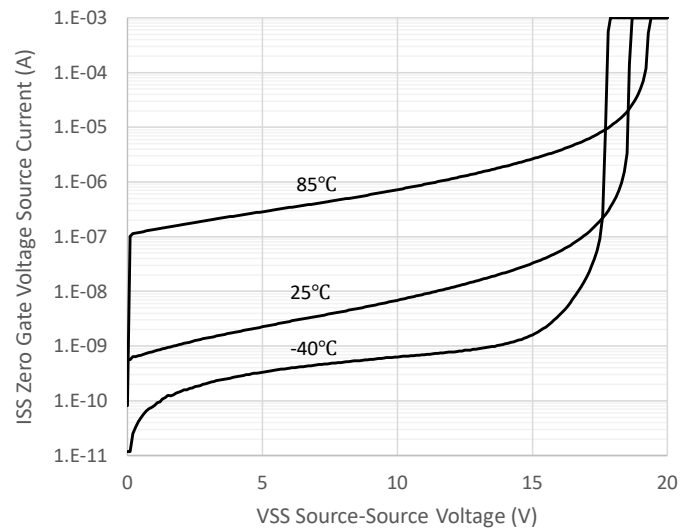
Note *2 Measurement Circuit for Switching Characteristics

FET1 Measurement Circuit for Switching Characteristics td(on), tr, td(off), tf (FET2: Gate-Source Short)


(Definition of Switching Measurement Detection)

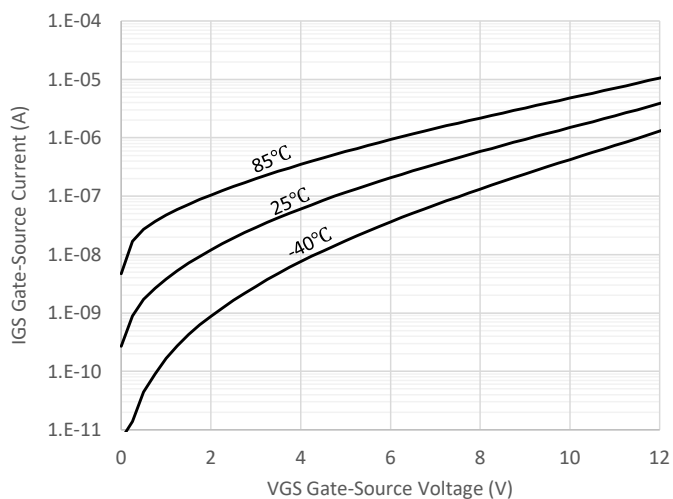


Test circuits for FET1
Test Circuit 1
VSSS/ISSS

Test Circuit 2
IGSS1/2

Test Circuit 3
Vth

Test Circuit 4
RSS(on)

Test Circuit 5
VF(S-S)


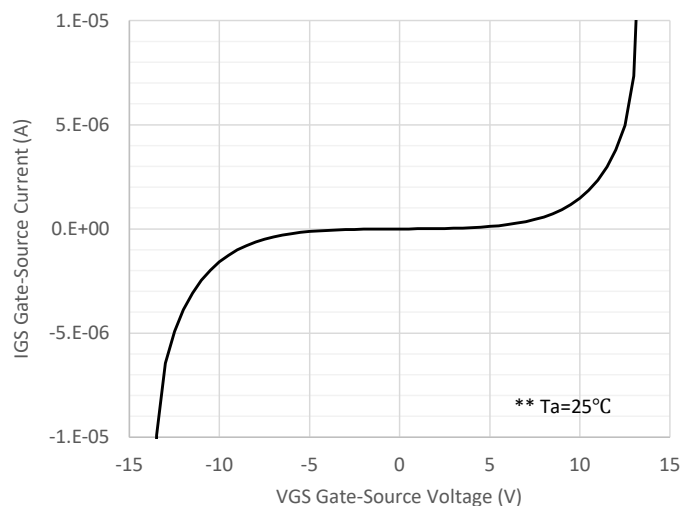
Technical data
IS to VSS

RSS(on) to IS

IS to VGS

RSS(on) to VGS

IF to VF

ISS to VSS


Technical data

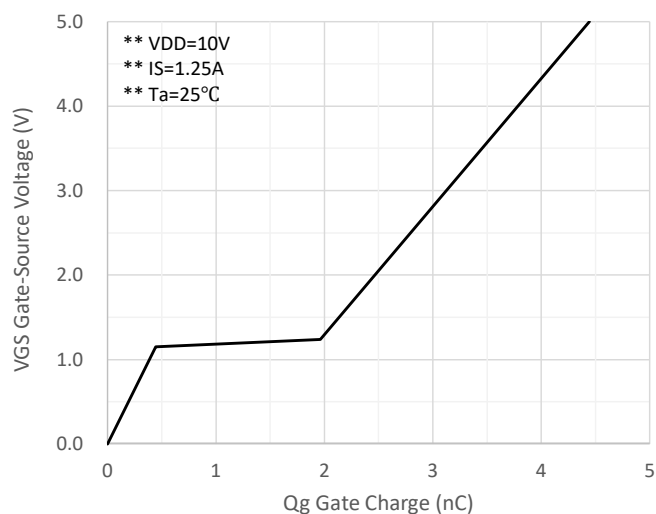
IGS to VGS



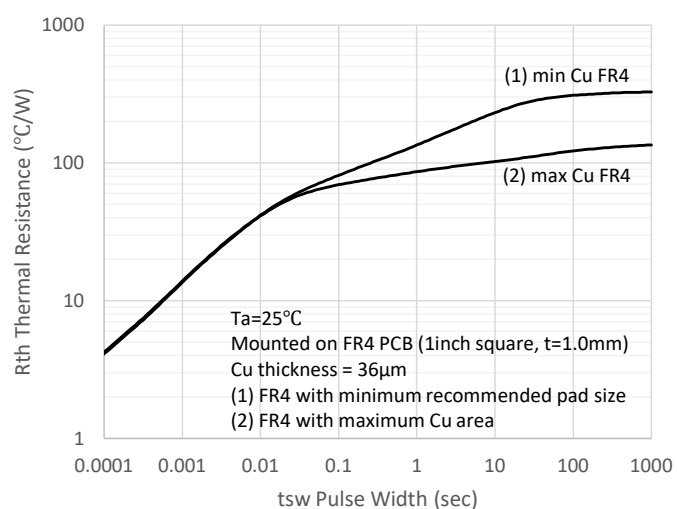
IGS to VGS



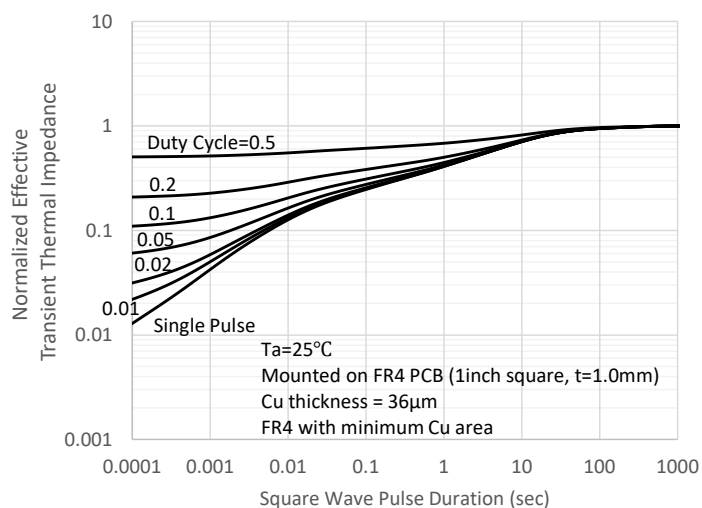
Dynamic Input / Output Characteristics



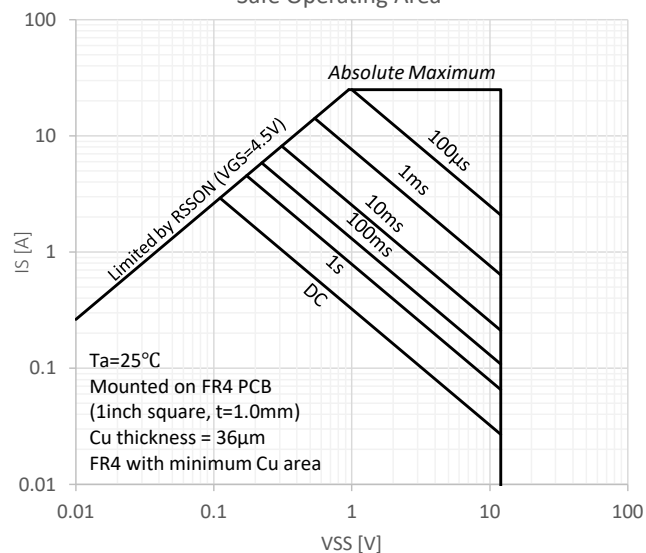
Rth to tsw



Thermal Response



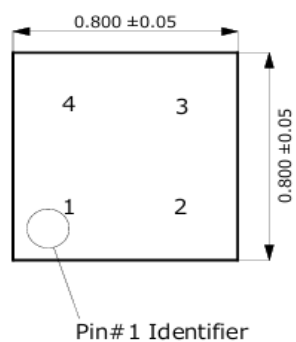
Safe Operating Area



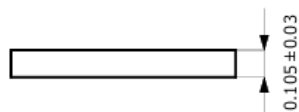
Package Outline Dimensions

(Unit: mm)

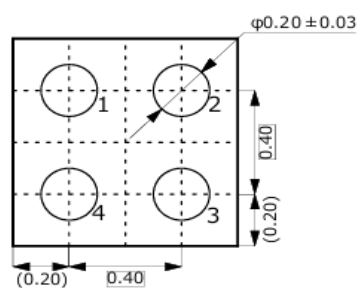
Top View



Front View

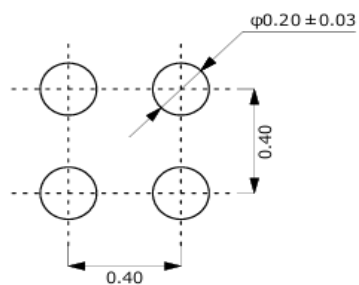


Bottom View



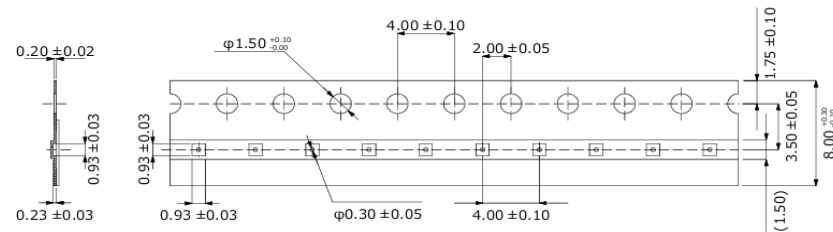
(Reference) Board Land and Stencil Mask Pattern

(Unit: mm)

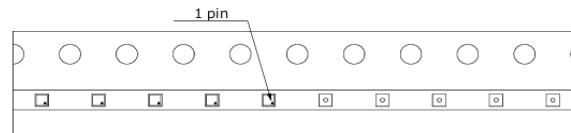


- ❖ Tape & Reel Embossed Type: 5,000pcs / reel
- ❖ Factory PKG Code: WLCSP 0.80X0.80A_4
- ❖ Tape Width: 8mm, Pitch: 4mm, Reel Size: 7inch

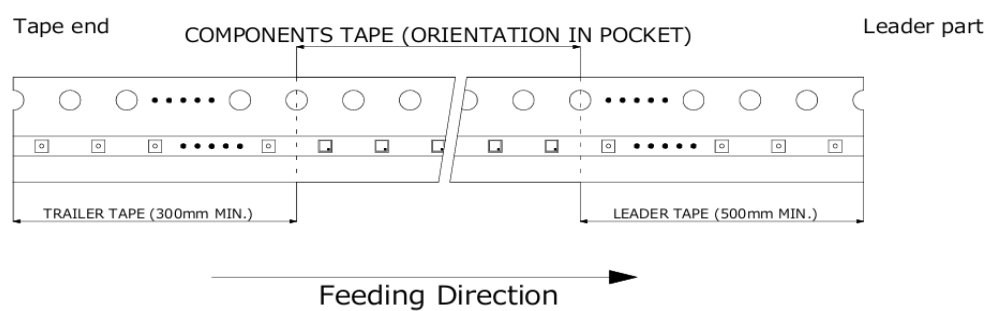
Tape size (mm)



Pin1 Direction



Tape end $\sim$ Leader part (mm)



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