

Dual N-channel Power MOSFET:
12V, 4.2mohm, 16.1A

Product Summary

VSSS	VGSS	RSS(ON) TYP/MAX		IS MAX
12V	± 8V	4.2/5.5	mΩ@VGS=4.5V	16.1A
		4.6/6.1	mΩ@VGS=3.8V	
		5.4/7.8	mΩ@VGS=3.1V	
		7.4/13.8	mΩ@VGS=2.5V	

Marking Symbol Code

- ❖ Laser Marking Device Code: A



GS : Gostone (fixed)
A : Marking Device Code (fixed)
G : Factory Code (fixed)
Y : Year Code
W : Week Code
L : LOT Code
● : Pin#1 Identifier

Form

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

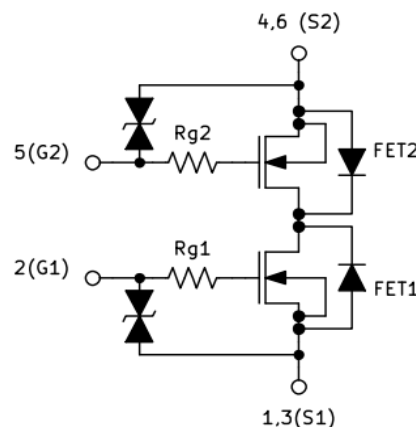
Features

- ❖ 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}	8.8 A
	DC	IS2 ^{*2}	16.1 A
	Pulse	ISP ^{*2*3}	64.6 A
Total Dissipation	DC	PD1 ^{*1}	0.45 W
	DC	PD2 ^{*2}	1.52 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}	277	°C/W
	Rth ^{*2}	82	°C/W

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

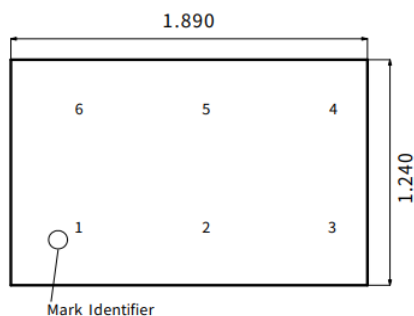
with minimum copper pad (44.6mm², 36μm thickness copper)

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

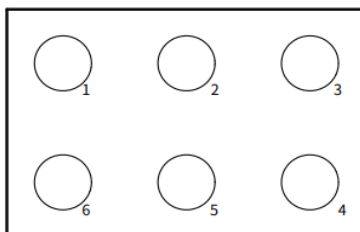
with maximum copper pad (617.5mm², 36μm thickness copper)

Note *3 t=10μs, duty cycle ≤ 1%

Top View



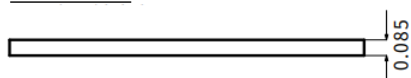
Bottom View



(Unit: mm)

1,3: Source1(FET1) 2: Gate1
4,6: Source2(FET2) 5: Gate2

Front View

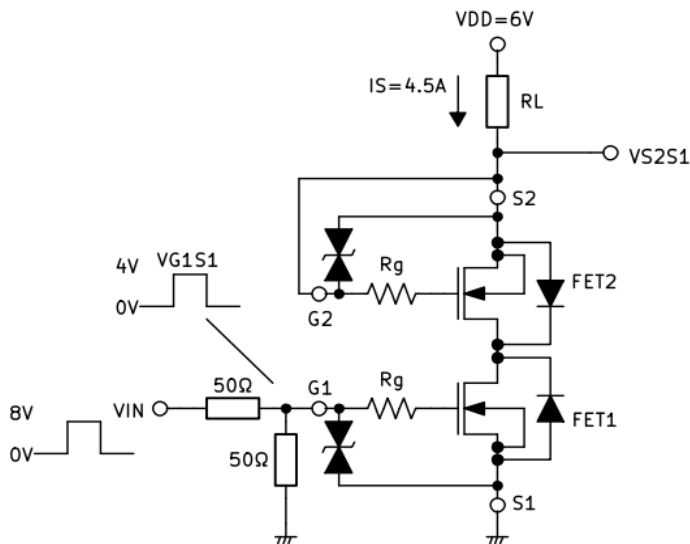


Electrical Characteristics (Ta=25degC +/- 3degC)

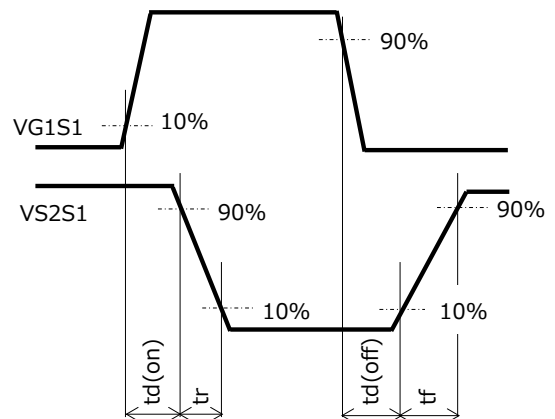
Parameter	Symbol	Conditions	Min	Typ	Max	Unit
Source-Source Breakdown Voltage	VSSS	IS=1mA, VGS=0V	12			V
Zero Gate Voltage Source Current	ISSS	VSS=12V, VGS=0V			1	μA
Gate-Source Leakage Current	IGSS1	VGS=±8V, VSS=0V			±10	μA
	IGSS2	VGS=±5V, VSS=0V			±1	μA
Gate-Source Threshold Voltage	Vth	VSS=6V, IS=1.0mA	0.35	0.90	1.40	V
Source-Source On-State Resistance	RSS(on)1	IS=4.5A, VGS=4.5V	2.9	4.2	5.5	mΩ
	RSS(on)2	IS=4.5A, VGS=3.8V	3.2	4.6	6.1	
	RSS(on)3	IS=4.5A, VGS=3.1V	3.4	5.4	7.8	
	RSS(on)4	IS=4.5A, VGS=2.5V	4.4	7.4	13.8	
Body Diode Forward Voltage	VF(S-S)	IF=4.5A, VGS=0V		0.7	1.0	V
Input Capacitance *1	Ciss	VSS=10V, VGS=0V, f=1kHz		1536		pF
Output Capacitance *1	Coss			446		
Reverse Transfer Capacitance *1	Crss			431		
Turn-On Delay Time *1 *2	td(on)	VDD=6V, VGS= 0 to 4V, IS=4.5A		0.3		μs
Rise Time *1 *2	tr			0.9		
Turn-Off Delay Time *1 *2	td(off)	VDD=6V, VGS= 4 to 0V, IS=4.5A		1.9		μs
Fall Time *1 *2	tf			1.8		
Total Gate Charge *1	Qg	VDD=6V, VGS= 0 to 4V, IS=9.0A		22.4		nC
Gate-Source Charge *1	Qgs			2.8		
Gate-Drain Charge *1	Qgd			9.6		
Gate Resistance *1	Rg	f=1MHz		425		Ω

Note *1 Guaranteed by Design

Note *2 Measurement Circuit for Switching Characteristics

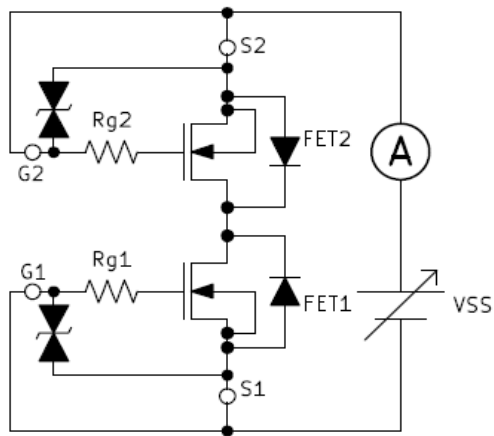
**FET1 Measurement Circuit for Switching Characteristics td(on), tr, td(off), tf
(FET2: Gate-Source Short)**


(Definition of Switching Measurement Detection)

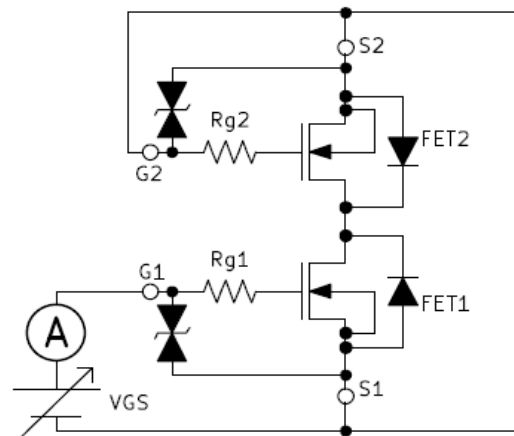


Test circuits for FET1

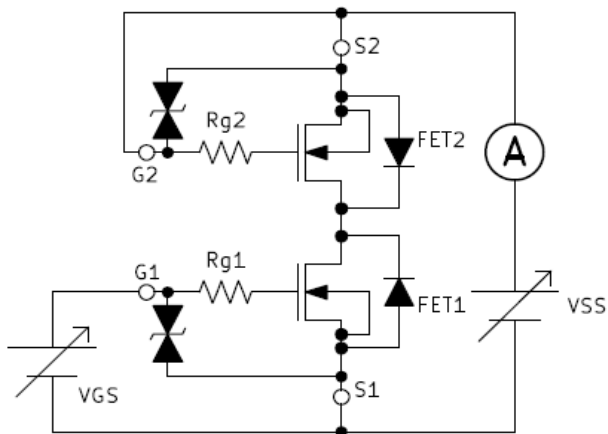
Test Circuit 1
VSSS/ISSS



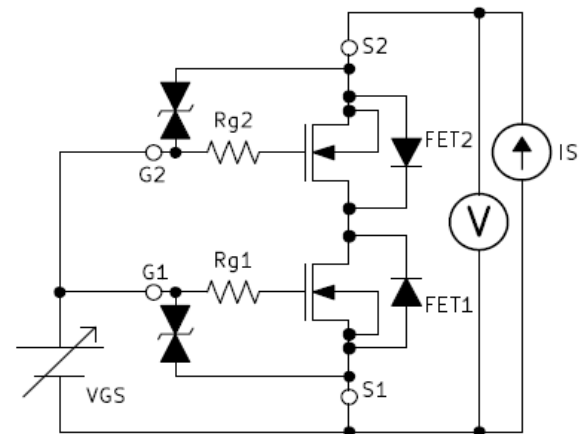
Test Circuit 2
IGSS1/2



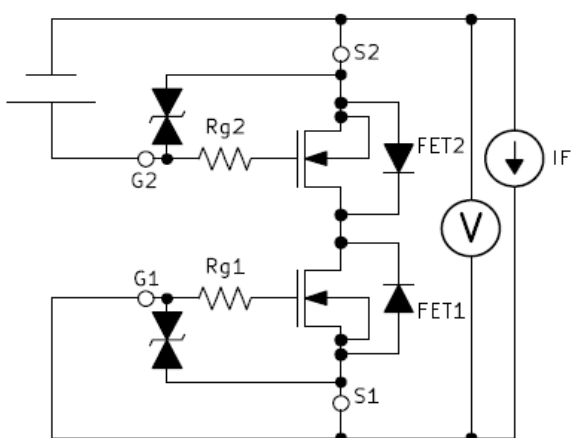
Test Circuit 3
Vth

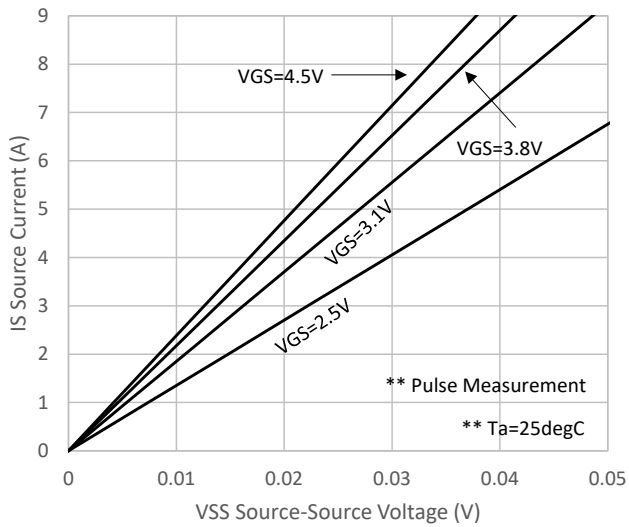
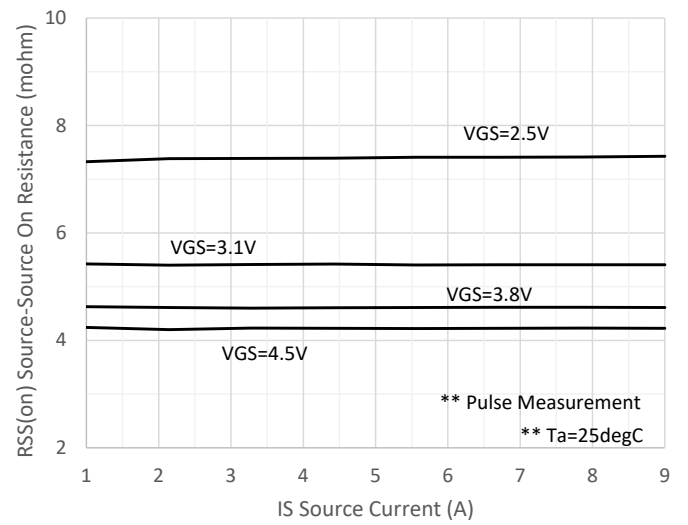
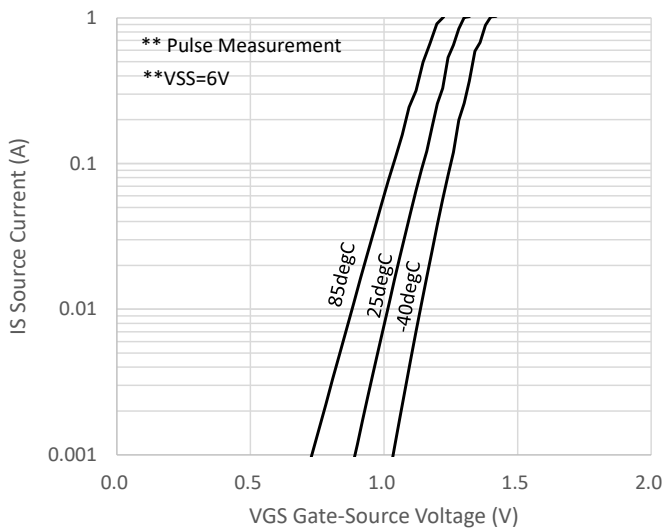
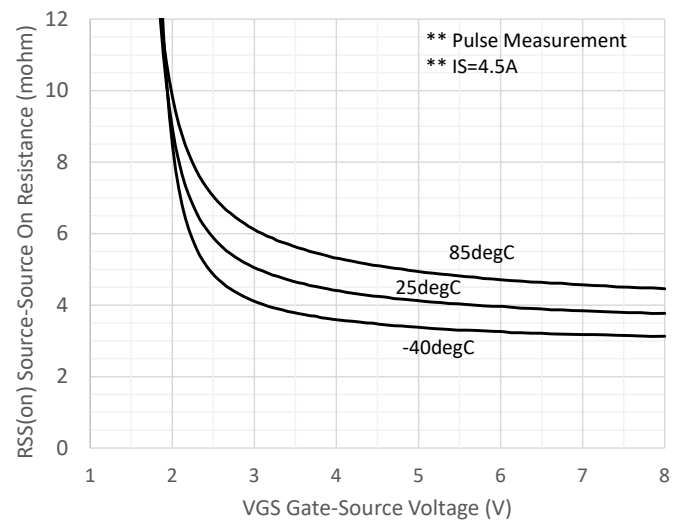
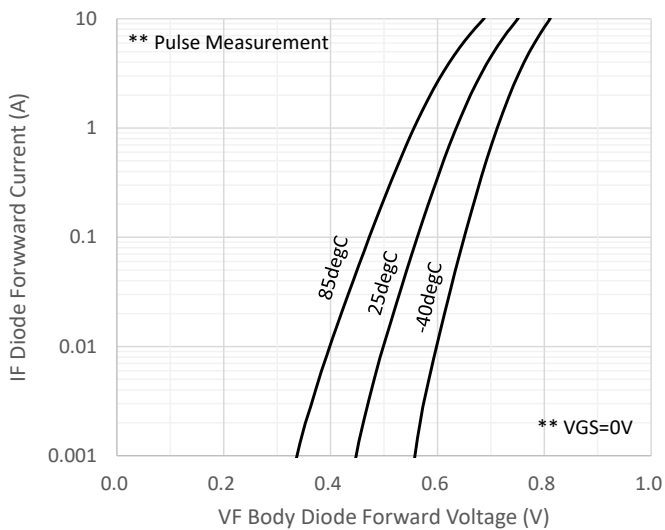
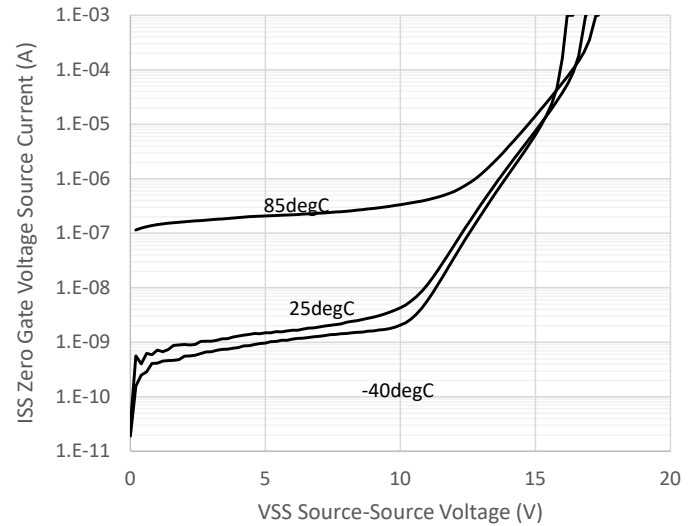


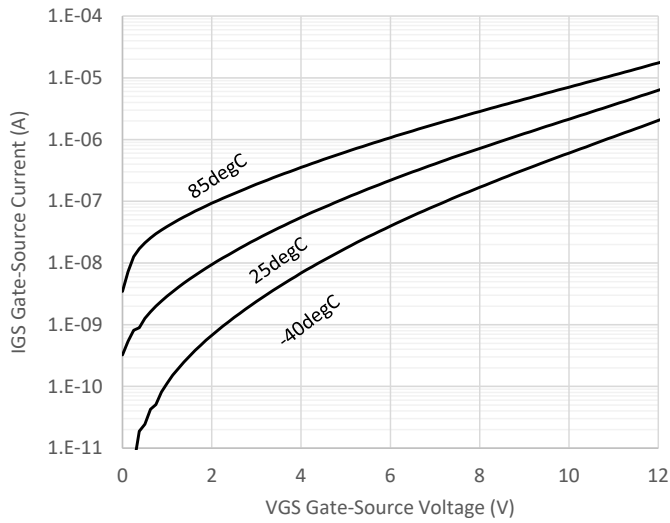
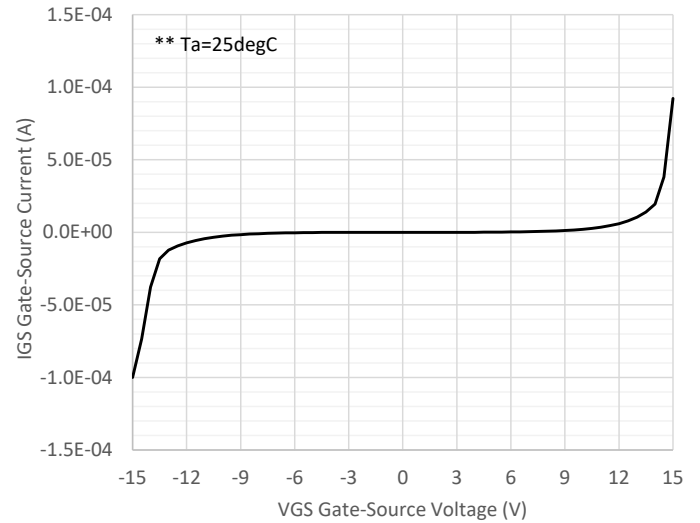
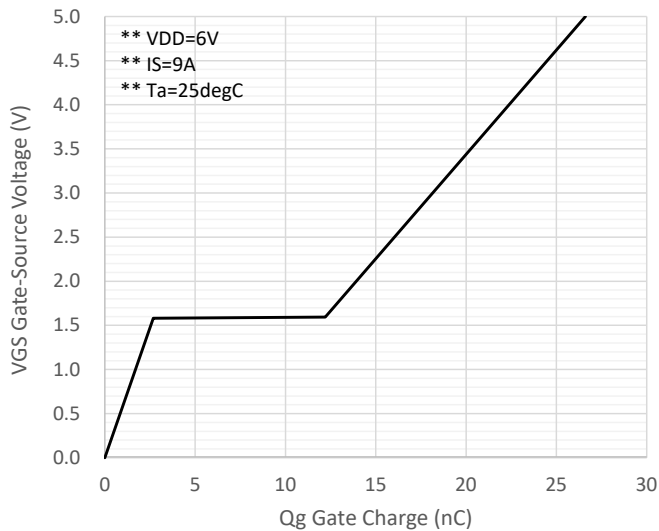
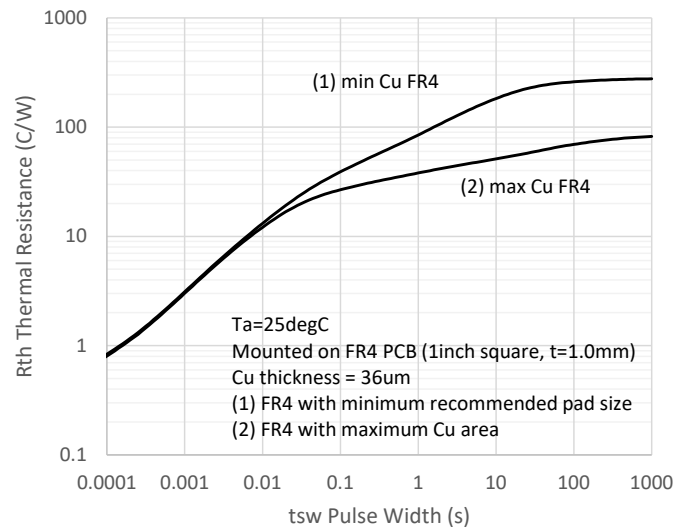
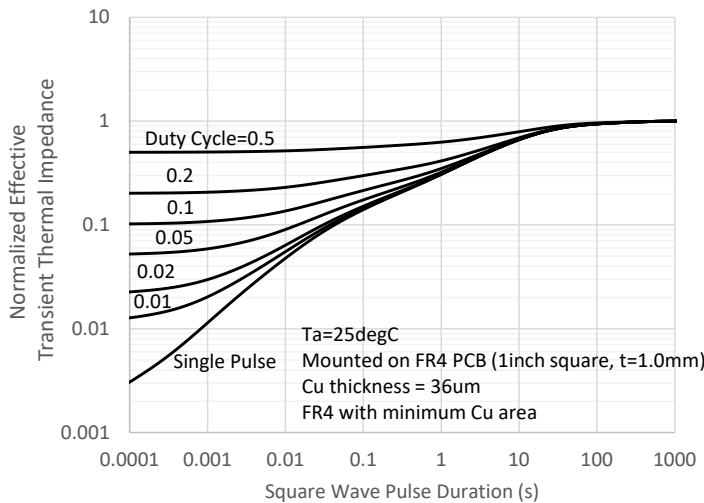
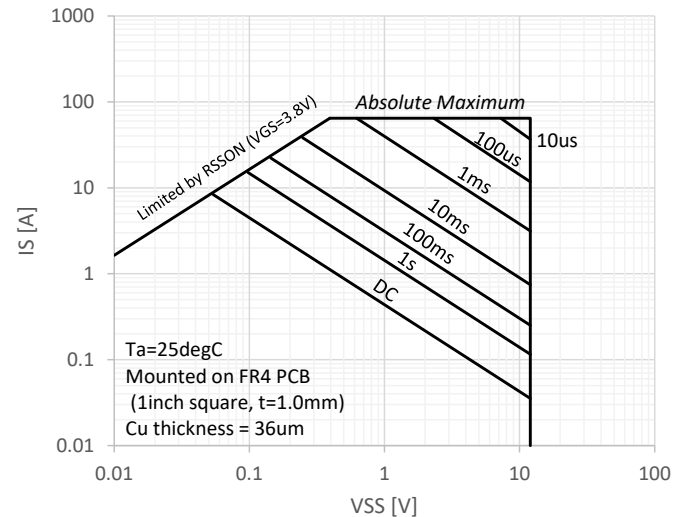
Test Circuit 4
RSS(on)



Test Circuit 5
VF(S-S)

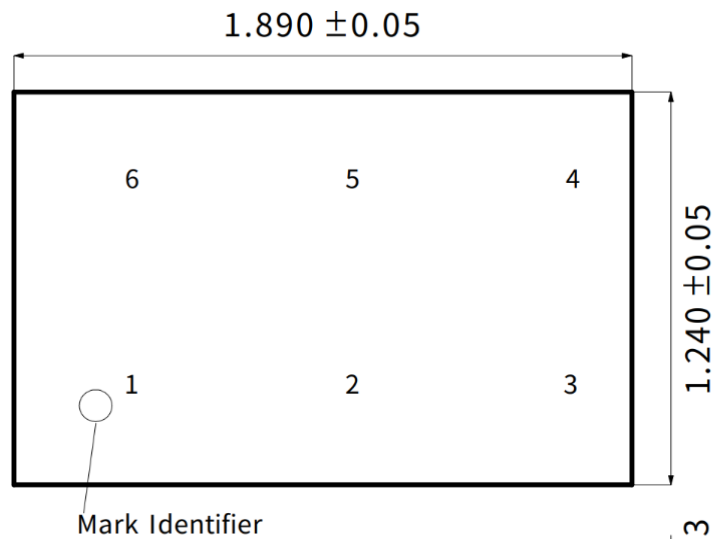


Technical data
IS to VSS

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


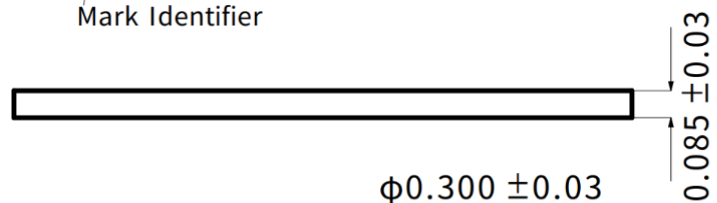
Package Outline Dimensions

Top View

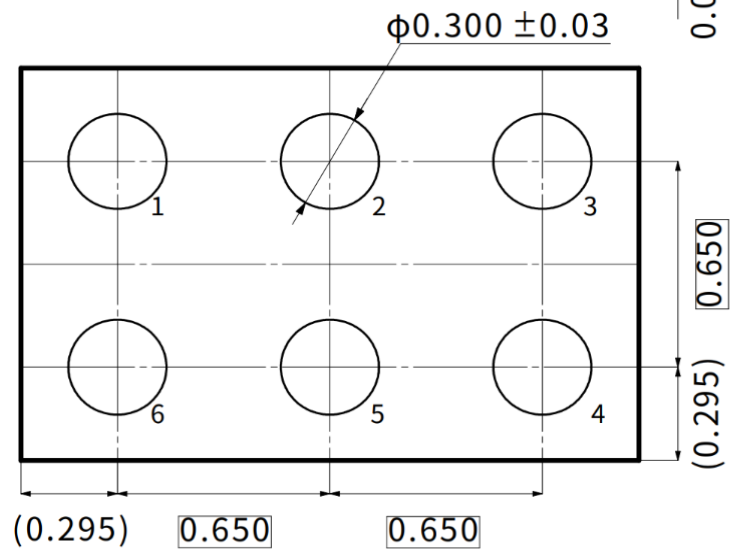


Unit: mm

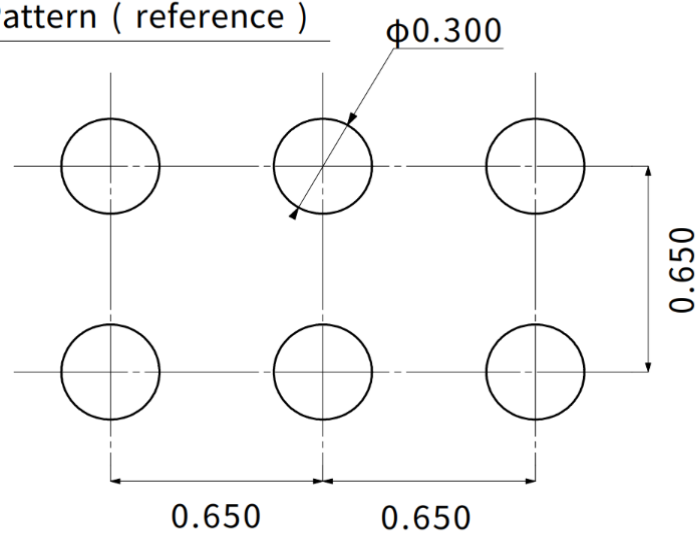
Front View



Bottom View



Land & Stencil Pattern (reference)

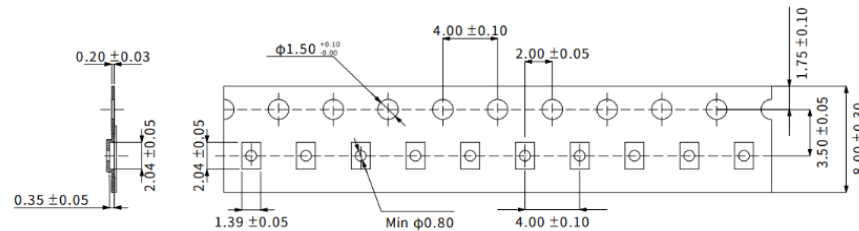


Unit: mm

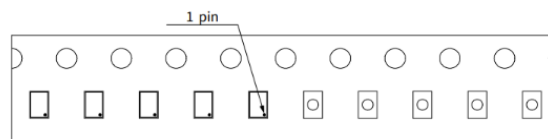
Form

- ❖ Tape & Reel Embossed Type: 5,000pcs / reel
- ❖ Factory PKG Code: WLCSP 1.89X1.24_6
- ❖ Tape Width: 8mm, Pitch: 4mm, Reel Size: 7inch

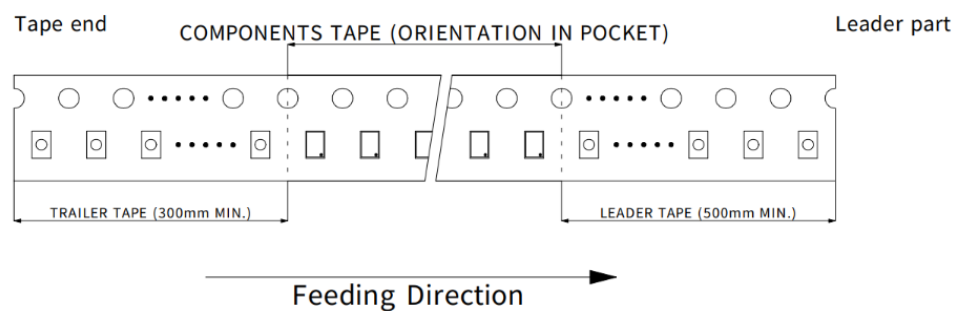
Tape size (mm)



Pin1 Direction



Tape end ~ Leader part (mm)



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