



# FC4B21080L

## Gate resistor installed Dual N-channel MOS FET

For lithium-ion secondary battery protection circuits

### ■ Features

- Low source-source ON resistance:  $R_{ss(on)}$  typ. = 27 m $\Omega$  (VGS = 4.5 V)
- CSP package: smallest & thinnest size
- RoHS compliant (EU RoHS / MSL: Level 1 compliant)

### ■ Marking Symbol: 12

### ■ Packaging

Embossed type (Thermo-compression sealing) : 20 000 pcs / reel (standard)

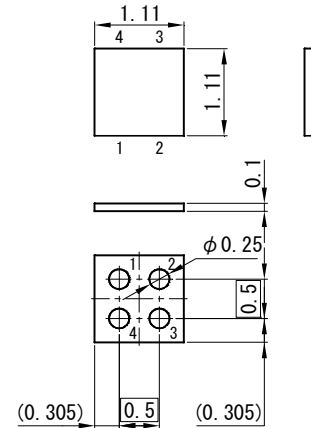
### ■ Absolute Maximum Ratings Ta = 25 °C

Parameter	Symbol	Rating	Unit
Source-source Voltage	VSS	12	V
Gate-source Voltage	VGS	±12	V
Source Current (DC) <sup>*1</sup>	IS	2.9	A
Source Current (Pulsed) <sup>*1,*2</sup>	ISp	29	A
Total Power Dissipation <sup>*1</sup>	PD	0.35	W
Channel Temperature	Tch	150	°C
Storage Temperature Range	Tstg	-55 to +150	°C
Thermal resistance (ch-a)	Rth(ch-a)	352	°C/W

Note <sup>\*1</sup> Mounted on FR4 board (25.4 mm × 25.4 mm × t1.0 mm)  
 using the minimum recommended pad size (Cu area = 47 mm<sup>2</sup> including traces).

<sup>\*2</sup> t = 10  $\mu$ s, Duty Cycle ≤ 1 %

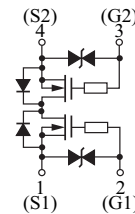
### ■ Package dimension Unit: mm



1. Source (FET1) 3. Gate (FET2)  
 2. Gate (FET1) 4. Source (FET2)

Panasonic	ULGA004-W-1212
JEITA	—
Code	—

### ■ Equivalent circuit, Pin name



1. Source (FET1) 3. Gate (FET2)  
 2. Gate (FET1) 4. Source (FET2)

■ Electrical Characteristics Ta = 25 °C ± 3 °C

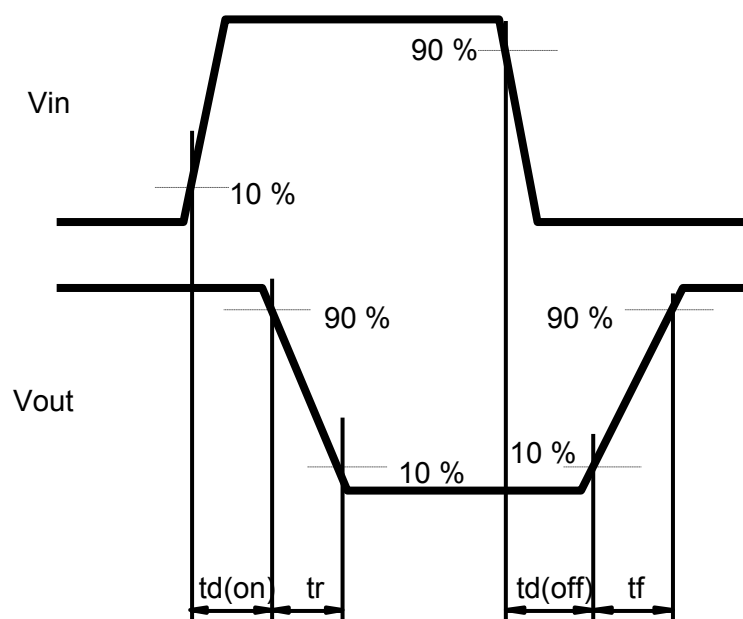
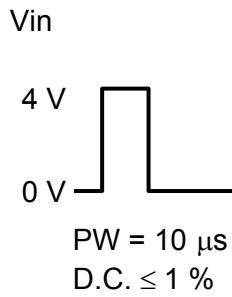
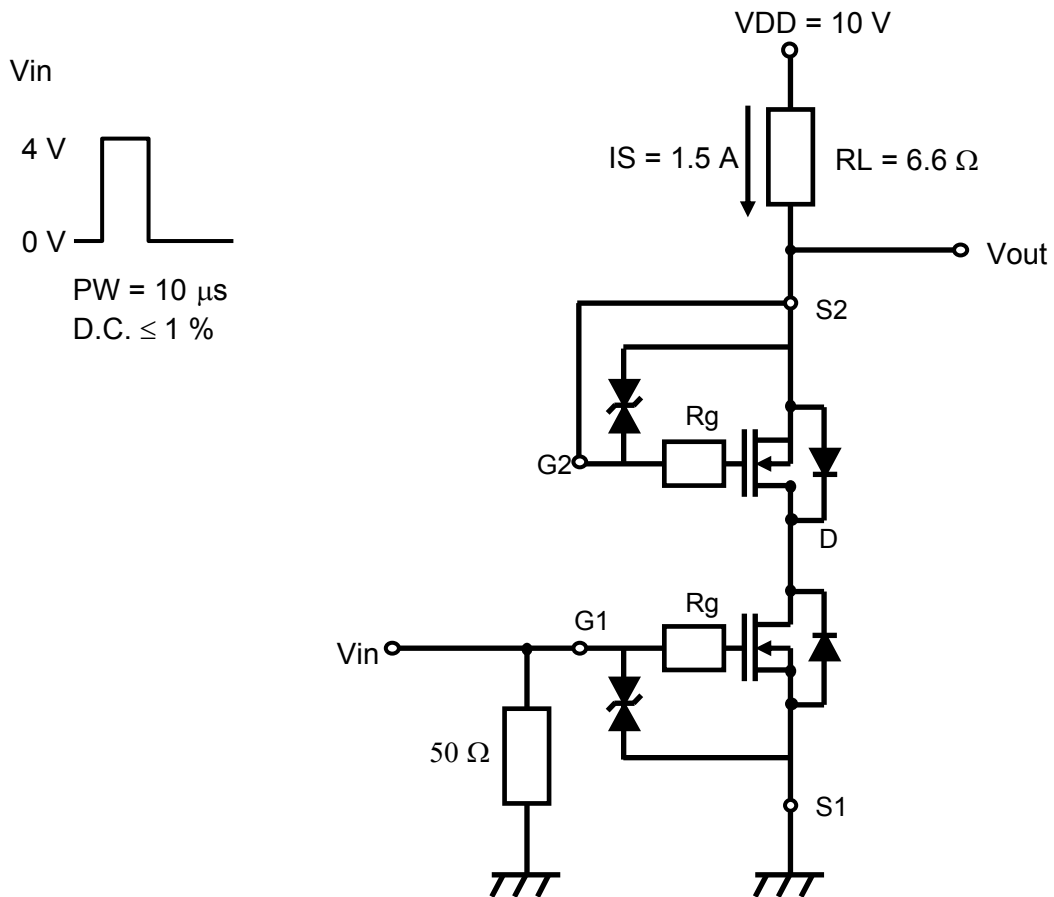
Parameter	Symbol	Conditions	Min	Typ	Max	Unit
Source-source Breakdown Voltage	VSSS	IS = 1 mA, VGS = 0 V	12			V
Zero Gate Voltage Source Current	ISSS	VSS = 12 V, VGS = 0 V			1.0	μA
Gate-source Leakage Current	IGSS	VGS = ±8 V, VSS = 0 V			±10	μA
		VGS = ±5 V, VSS = 0 V			±1.0	
Gate-source Threshold Voltage	Vth	IS = 1.0 mA, VSS = 10 V	0.4	0.85	1.4	V
Source-source On-state Resistance	RSS(on)1	IS = 1.5 A, VGS = 4.5 V	18	27	37	mΩ
	RSS(on)2	IS = 1.5 A, VGS = 3.8 V	21	30	41.5	
	RSS(on)3	IS = 1.5 A, VGS = 3.1 V	23	39	64	
	RSS(on)4	IS = 1.5 A, VGS = 2.5 V	30	60	100	
Input Capacitance *1	Ciss	VSS = 10 V, VGS = 0 V, f = 1 MHz		850		pF
Output Capacitance *1	Coss			205		
Reverse Transfer Capacitance *1	Crss			203		
Turn-on delay Time *1,*2	td(on)	VDD = 10 V, VGS = 0 to 4.0 V		0.6		μs
Rise Time *1,*2	tr	IS = 1.5 A		1.7		
Turn-off delay Time *1,*2	td(off)	VDD = 10 V, VGS = 4.0 to 0 V		2.6		μs
Fall Time *1,*2	tf	IS = 1.5 A		3.1		
Total Gate Charge *1	Qg	VDD = 10 V		7.1		nC
Gate-source Charge *1	Qgs	VGS = 0 to 4.0 V,		1.5		
Gate-drain Charge *1	Qgd	IS = 2.9 A		2.7		
Body Diode Forward Voltage	VF(s-s)	IF = 2.9 A, VGS = 0 V		0.8	1.2	V

Note Measuring methods are based on JAPANESE INDUSTRIAL STANDARD JIS C 7030 Measuring methods for transistors.

\*1 Assured by design

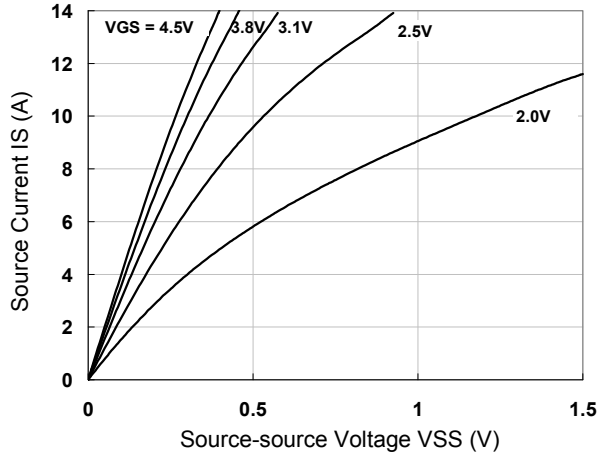
\*2 Measurement circuit for Turn-on Delay Time / Rise Time / Turn-off Delay Time / Fall Time

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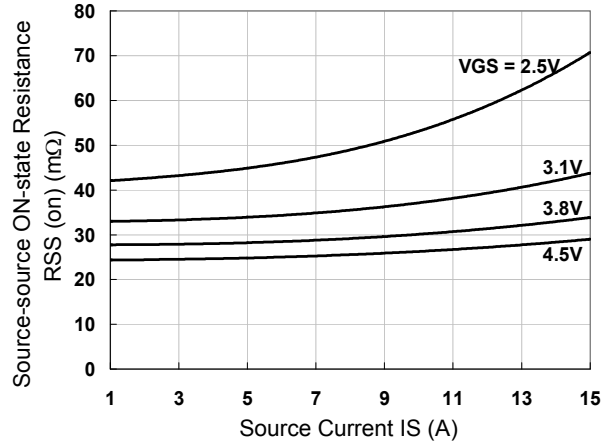


Technical Data ( reference )

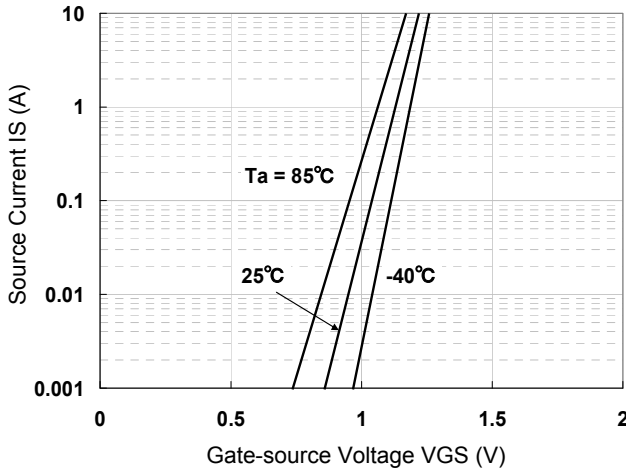
IS - VSS



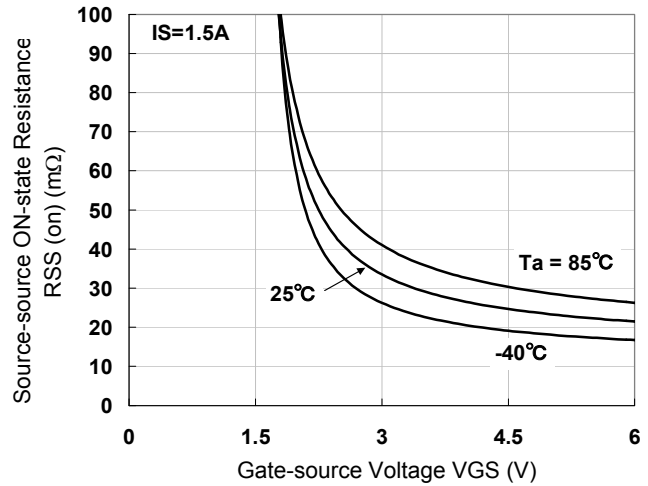
RDS(on) - ID



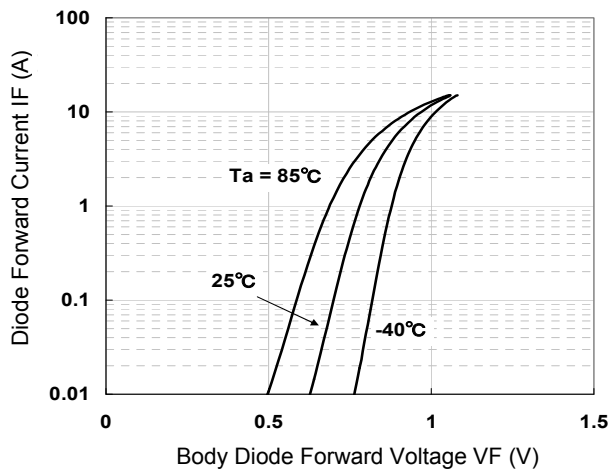
IS - VGS



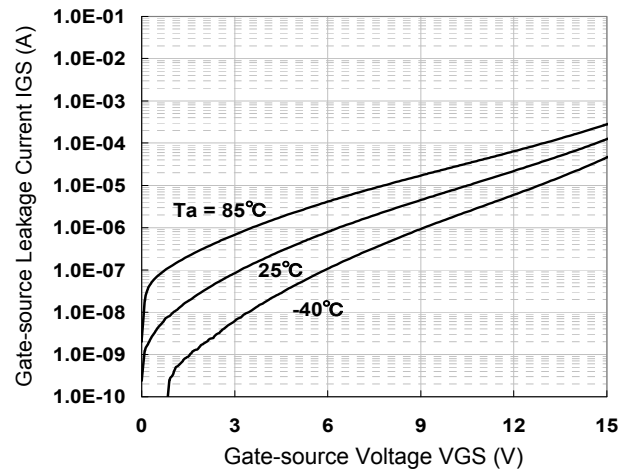
RDS(on) - VGS



IF - VF



IGS - VGS

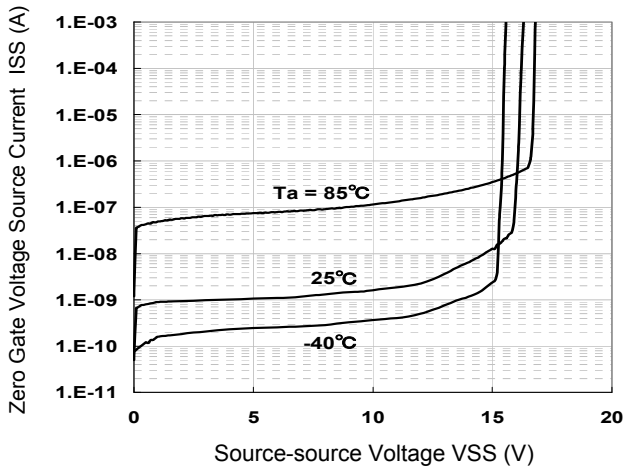




Technical Data ( reference )

ISSS - VSSS

Destruction Current

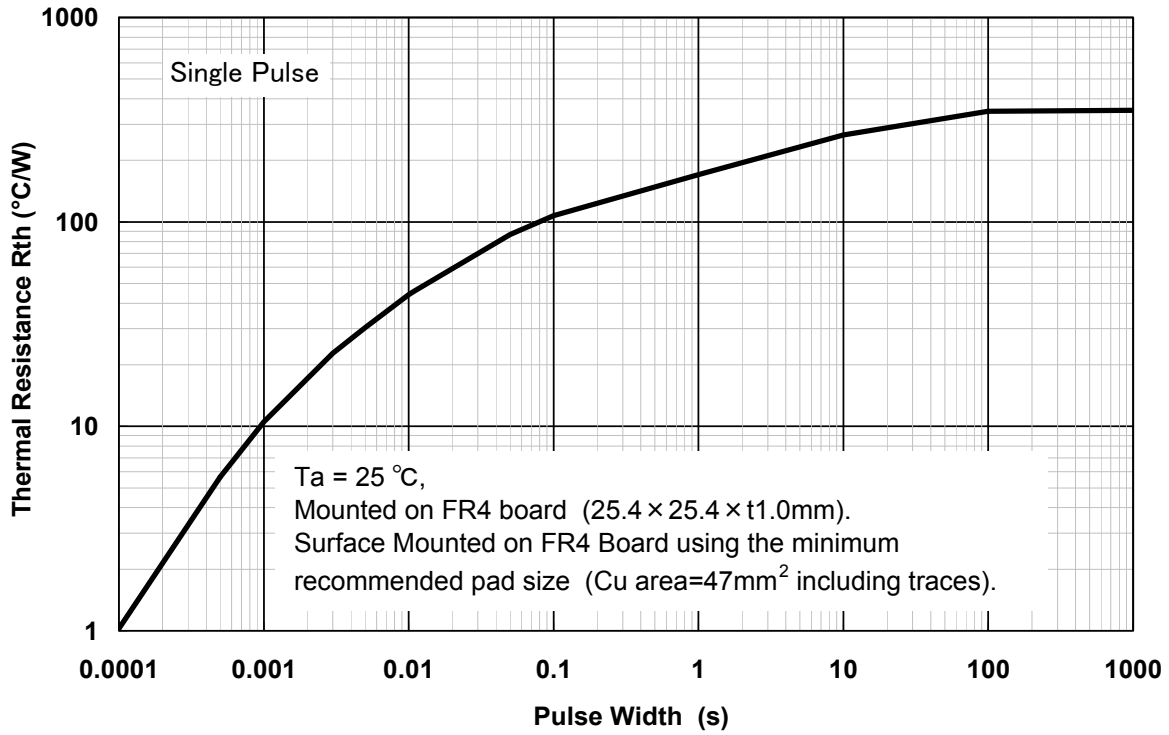


Parameter	Conditions	Result
Operation Test *1	VGS = 3.8 V, IS = 12 A, t = 3 ms	PASS
	VGS = 3.8 V, IS = 4.5 A, t = 11 ms	PASS
Destruction Current *1	VGS = 3.8 V, t = 3 ms	31 A
	VGS = 3.8 V, t = 11 ms	16 A

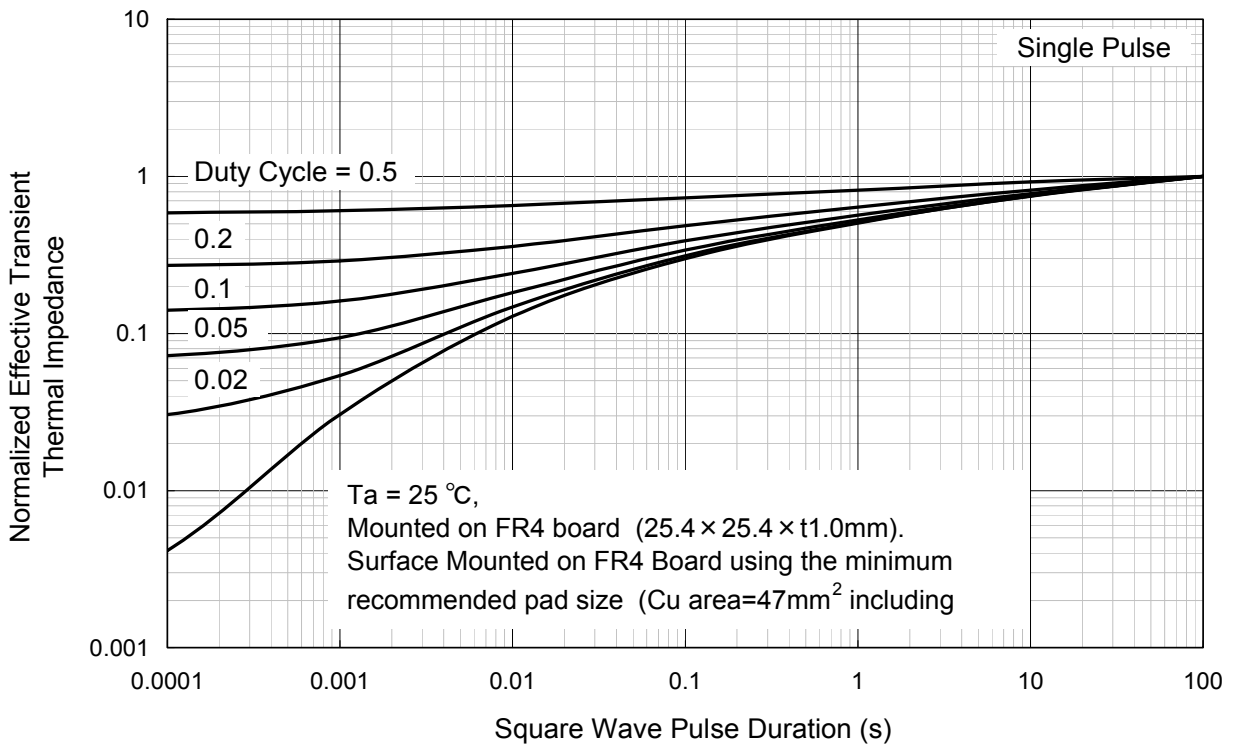
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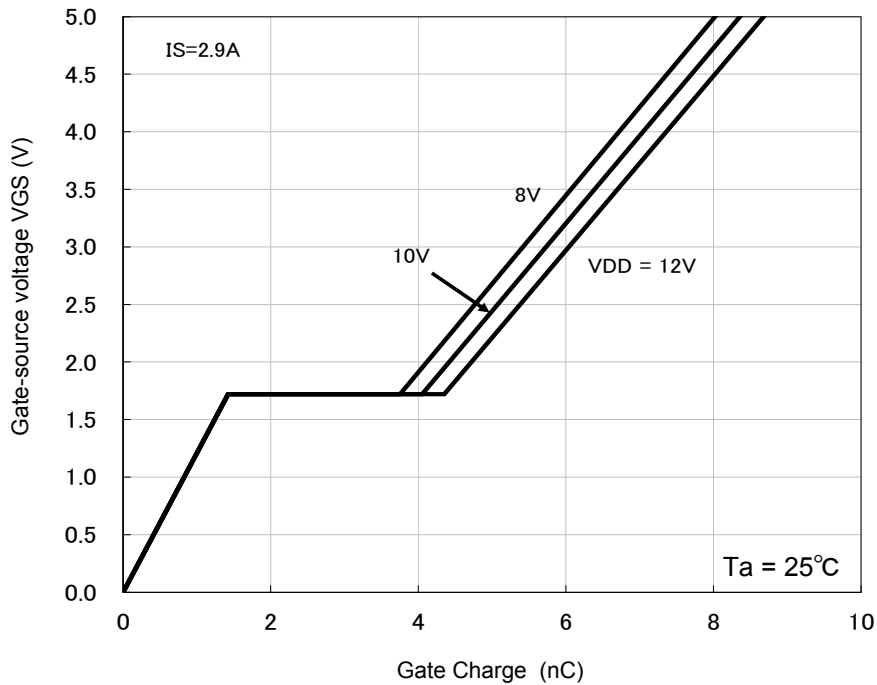
Rth - tsw



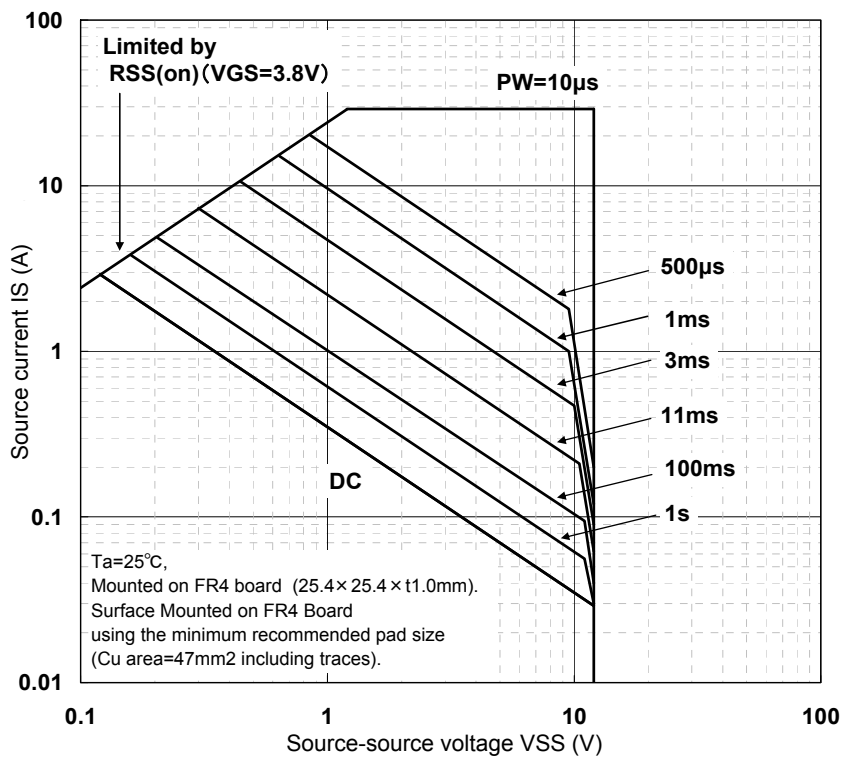
Thermal Response



Technical Data ( reference )  
 Dynamic Input/Output Characteristics

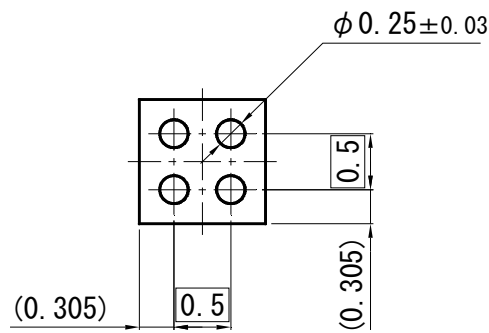
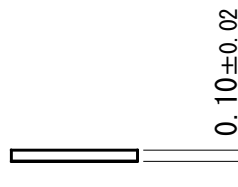
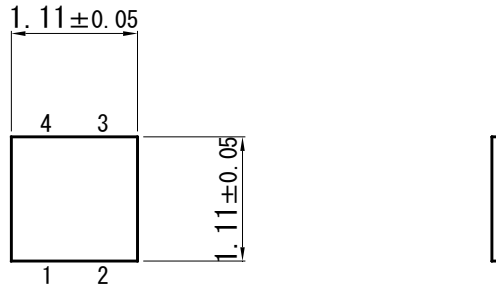


Safe Operating Area

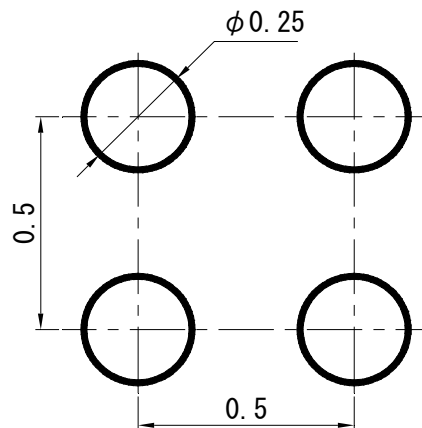


ULGA004-W-1212

Unit: mm



■ Land Pattern (Reference) (Unit: mm)





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