

Notification about the transfer of the semiconductor business

The semiconductor business of Panasonic Corporation was transferred on September 1, 2020 to Nuvoton Technology Corporation (hereinafter referred to as "Nuvoton"). Accordingly, Panasonic Semiconductor Solutions Co., Ltd. became under the umbrella of the Nuvoton Group, with the new name of Nuvoton Technology Corporation Japan (hereinafter referred to as "NTCJ").

In accordance with this transfer, semiconductor products will be handled as NTCJ-made products after September 1, 2020. However, such products will be continuously sold through Panasonic Corporation.

Publisher of this Document is NTCJ.

If you would find description "Panasonic" or "Panasonic semiconductor solutions", please replace it with NTCJ.

※ Except below description page

"Request for your special attention and precautions in using the technical information and semiconductors described in this book"

Nuvoton Technology Corporation Japan

FC4A22050L

Gate Resistor installed Dual N-Channel MOS Type

For lithium-ion secondary battery protection circuit

■ Features

- Low source-source ON resistance: $R_{ss(on)typ} = 19.5\text{ m}\Omega$ ($V_{GS} = 4.5V$)
- CSP package: smallest & thinnest size
- Halogen-free / RoHS compliant
(EU RoHS / UL-94 V-0 / MSL: Level 1 compliant)

■ Marking Symbol: 11

■ Packaging

FC4A22050L Embossed type (Thermo-compression sealing):
5 000 pcs / reel (standard)

■ Absolute Maximum Ratings $T_a = 25\text{ }^\circ\text{C}$

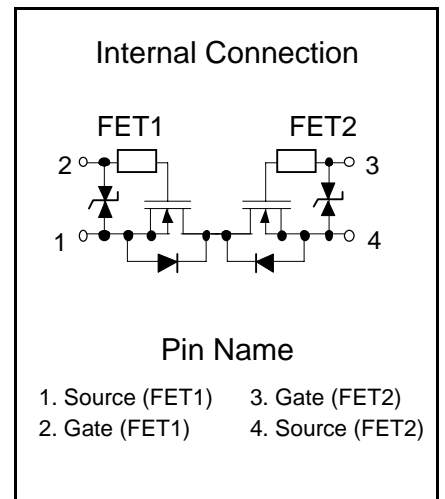
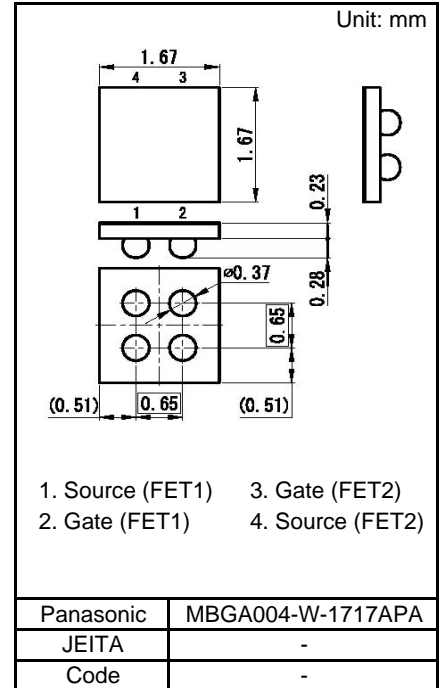
Parameter		Symbol	Rating	Unit
FET1	Source-source Voltage	VSS	24	V
	Gate-source Voltage	VGS	± 12	V
FET2	Source Current (DC) ^{*1}	IS	3.5	A
	Source Current (Pulsed) ^{*1,*2}	ISp	35	A
Overall	Total Power Dissipation ^{*1}	PD	0.4	W
	Channel Temperature	Tch	150	$^\circ\text{C}$
	Storage Temperature Range	Tstg	-55 to +150	$^\circ\text{C}$

■ Thermal Characteristics

Parameter	Symbol	Rating	Unit
Thermal Resistance, Channel to Ambient	Rth (ch-a)	312	$^\circ\text{C/W}$

Note ^{*1} Mounted on FR4 board (25.4 mm × 25.4 mm × 1.0 mm).
Surface Mounted on FR4 Board using the minimum recommended pad size (Cu area = 47 mm² including traces).

^{*2} t = 10 μs , Duty Cycle $\leq 1\%$



■ 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	24			V
Zero Gate Voltage source Current	ISSS	VSS = 24 V, VGS = 0 V			1.0	μA
Gate-source Leakage Current	IGSS	VGS = ±8 V, VSS = 0 V			±10	μA
Gate-source Threshold Voltage	Vth	IS = 1.0 mA, VSS = 10 V	0.4	0.85	1.5	V
Source-source On-State Resistance	RSS(on)1	IS = 3.0 A, VGS = 4.5 V	14	19.5	28	mΩ
	RSS(on)2	IS = 3.0 A, VGS = 3.1 V	15	23	32	
	RSS(on)3	IS = 3.0 A, VGS = 2.5 V	18	27	37	
Input Capacitance ^{*1}	Ciss	VSS = 10 V, VGS = 0 V, f = 1 MHz		1 780		pF
Output Capacitance ^{*1}	Coss			410		
Reverse Transfer Capacitance ^{*1}	Crss			407		
Turn-on Delay Time ^{*1,*2}	td(on)	VDD = 10 V, VGS = 0 to 4.0 V		0.8		μs
Rise Time ^{*1,*2}	tr	IS = 3 A		1.5		
Turn-off Delay Time ^{*1,*2}	td(off)	VDD = 10 V, VGS = 4.0 to 0 V		6		μs
Fall Time ^{*1,*2}	tf	IS = 3 A		3		
Total Gate Charge ^{*1}	Qg	VDD = 10 V, VGS = 0 to 4.0 V, IS = 3.5 A		15		nC
Gate-Source Charge ^{*1}	Qgs			4.1		
Gate-Drain Charge ^{*1}	Qgd			3.8		

Note: *1 Assured by design

*2 See Test circuit

DESTRUCTION CURRENT

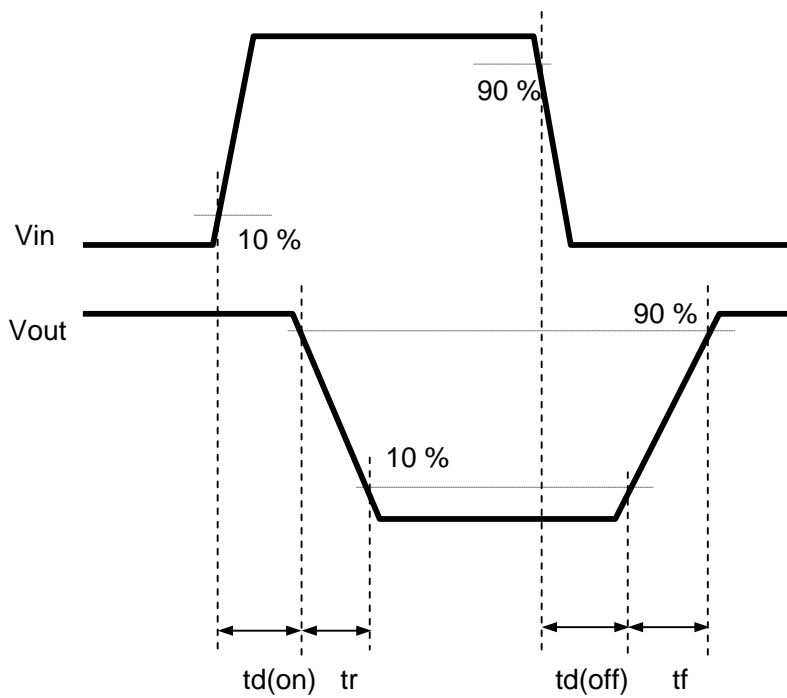
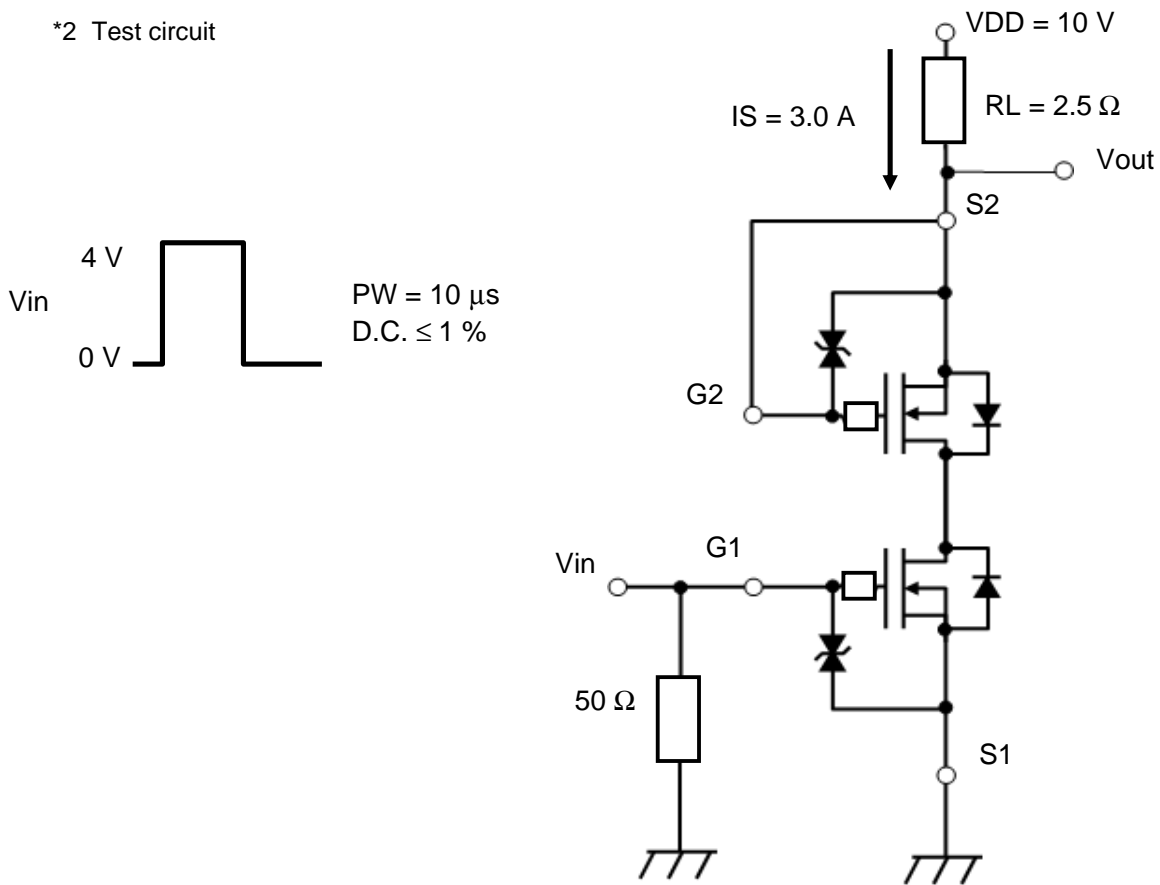
	Condition	Result
Operation test	VGS = 3.8 V t = 3 ms, IS = 40 A	PASS
	VGS = 3.8 V t = 11 ms, IS = 15 A	PASS
Destruction current	VGS = 3.8 V t = 3 ms	55 A
	VGS = 3.8 V t = 11 ms	35 A

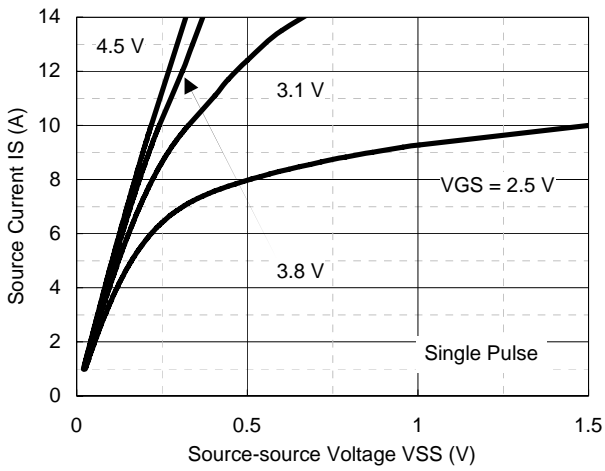
Ta = 25 °C,

Mounted on FR4 board (25.4 × 25.4 × 1.0 mm).

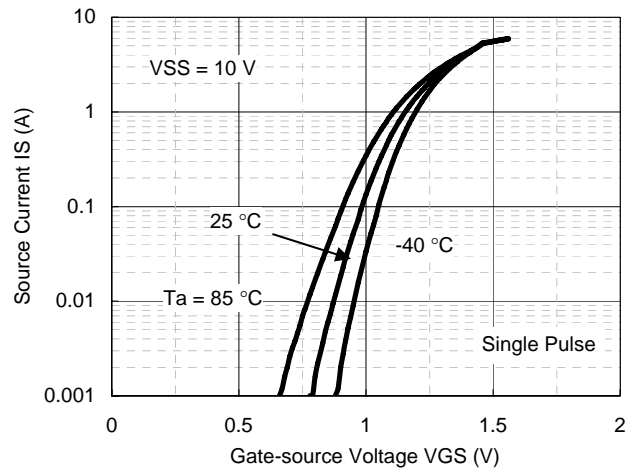
Surface Mounted on FR4 Board using the minimum recommended pad size(Cu area = 47 mm² including traces).

*2 Test circuit

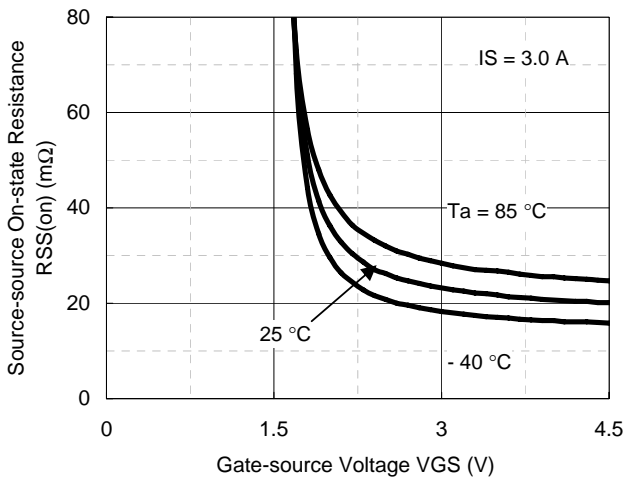




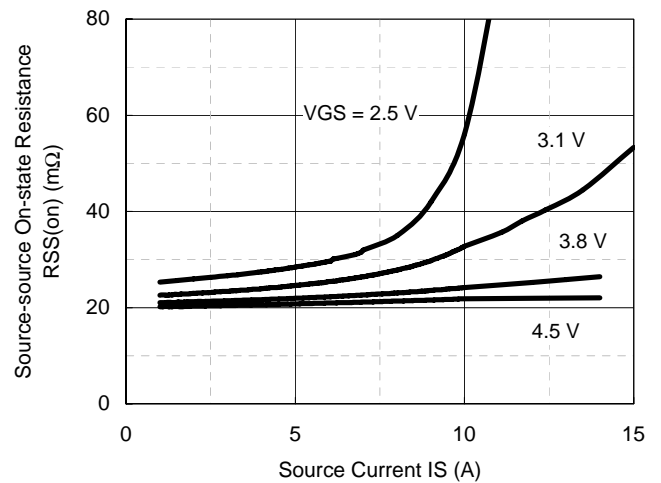
IS - VSS



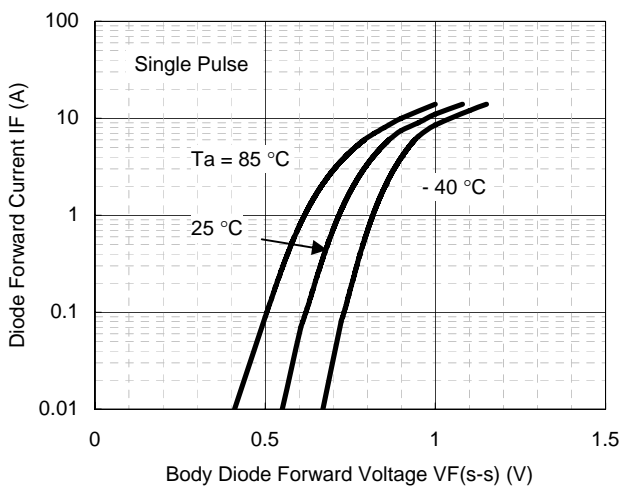
IS - VGS



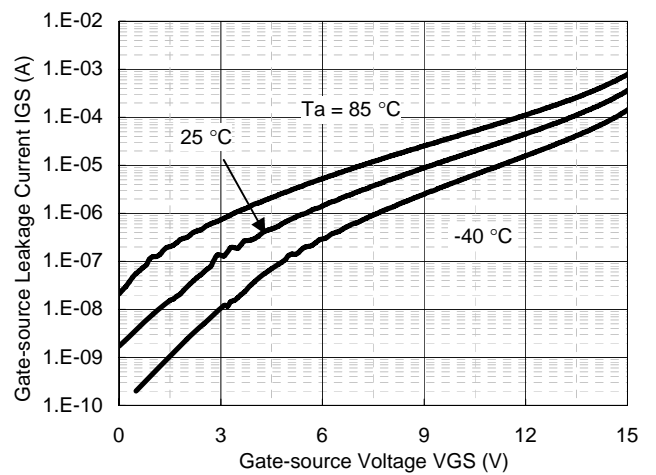
RSS(on) - VGS



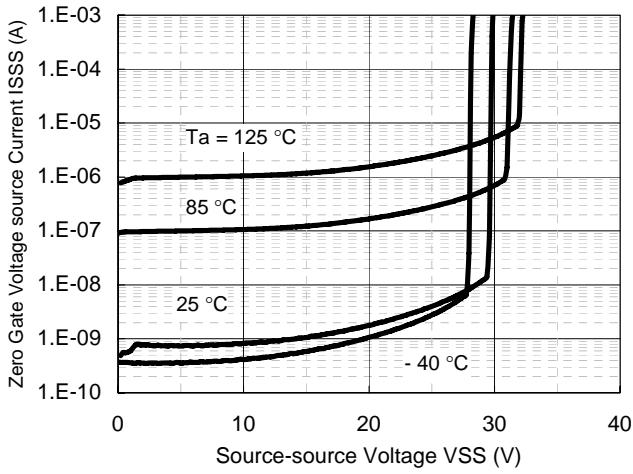
RSS(on) - IS



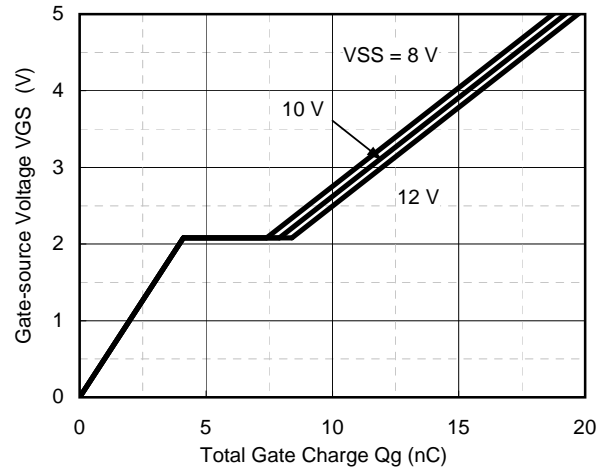
IF - VF(s-s)



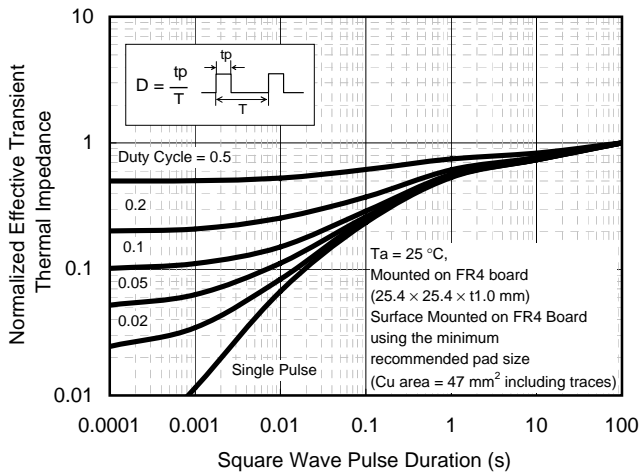
IGS - VGS



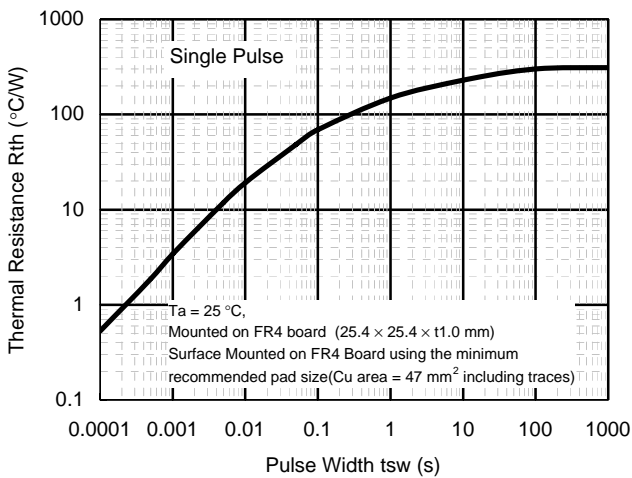
ISSS - VSS



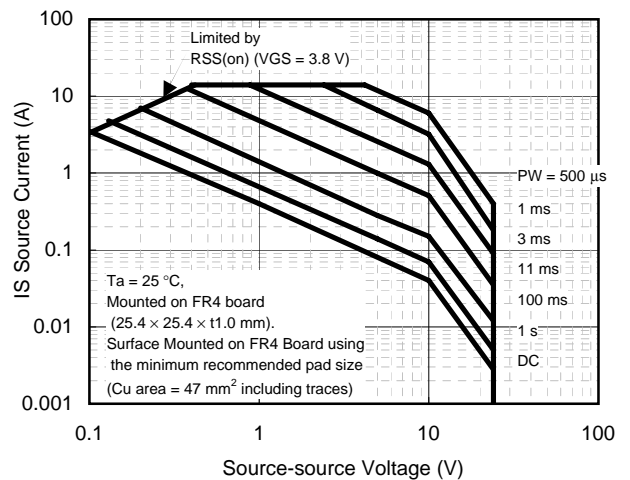
Dynamic Input/Output Characteristics



Thermal Response



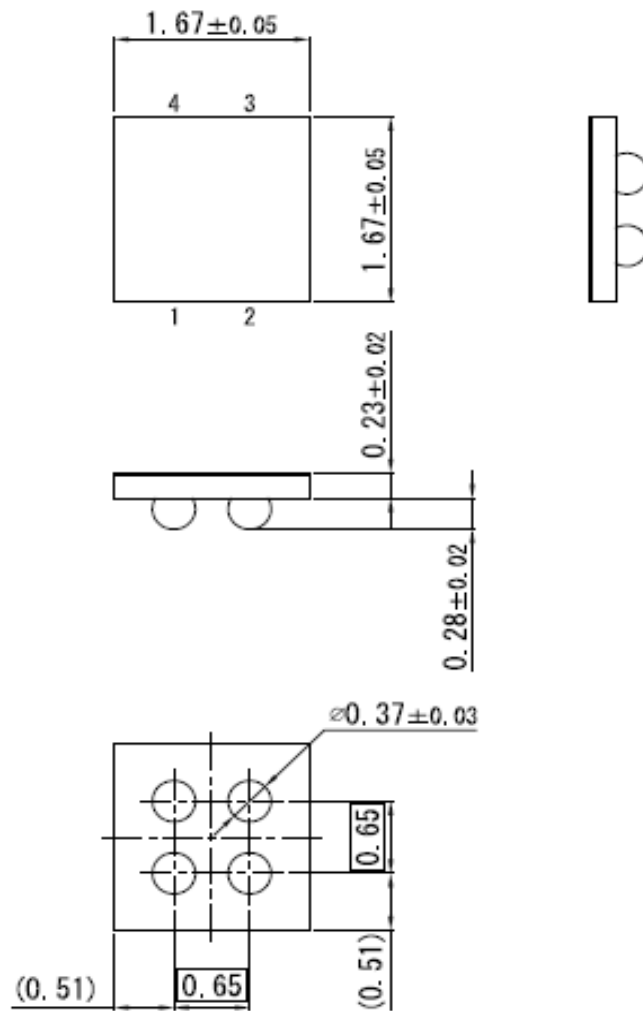
Rth -tsw



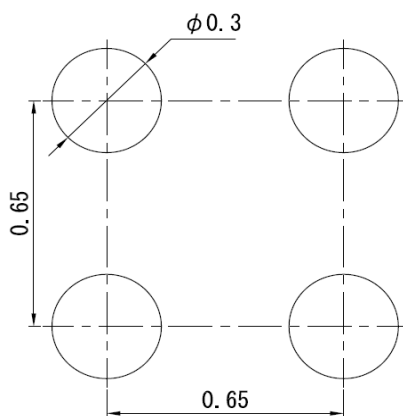
Safe Operating Area

MBGA004-W-1717APA

Unit: mm



■ Land Pattern (Reference) (Unit: mm)



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