

To our customers,

Old Company Name in Catalogs and Other Documents

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Renesas Electronics website: <http://www.renesas.com>

April 1st, 2010
Renesas Electronics Corporation

Issued by: Renesas Electronics Corporation (<http://www.renesas.com>)

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Not recommended
for new design

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DUAL N-CANNEL MOSFET
FOR SWITCHING

DESCRIPTION

The μ PA2650T1E is a switching device, which can be driven directly by a 4.5 V power source.

The μ PA2650T1E contains dual MOSFET which features a low on-state resistance and excellent switching characteristics, and is suitable for applications such as DC/DC converter of portable machine and so on.

FEATURES

- 4.5 V drive available MOSFET
- Low on-state resistance MOSFET

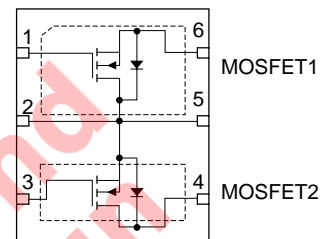
MOSFET1 $R_{DS(on)1} = 48 \text{ m}\Omega$ TYP. ($V_{GS} = 10 \text{ V}$, $I_D = 3.0 \text{ A}$)

$R_{DS(on)2} = 55 \text{ m}\Omega$ TYP. ($V_{GS} = 4.5 \text{ V}$, $I_D = 3.0 \text{ A}$)

MOSFET2 $R_{DS(on)1} = 50 \text{ m}\Omega$ TYP. ($V_{GS} = 10 \text{ V}$, $I_D = 3.0 \text{ A}$)

$R_{DS(on)2} = 57 \text{ m}\Omega$ TYP. ($V_{GS} = 4.5 \text{ V}$, $I_D = 3.0 \text{ A}$)

PIN CONNECTION (Top View)



- 1: Gate1
- 2: Drain1/Source2 (Heat sink2)
- 3: Gate2
- 4: Drain2 (Heat sink1)
- 5: Drain1/Source2 (Heat sink2)
- 6: Source1

ORDERING INFORMATION

PART NUMBER	PACKAGE
μ PA2650T1E	6LD3x3MLP

Marking: A2650

Remark The diode connected between the gate and source of the transistor serves as a protector against ESD. When this device actually used, an additional protection circuit is externally required if a voltage exceeding the rated voltage may be applied to this device.

Caution This product is electrostatic-sensitive device due to low ESD capability and should be handled with caution for electrostatic discharge.

$V_{ESD} = \pm 150 \text{ V TYP. (C = 200 pF, R = 0 \Omega, \text{Single Pulse})}$

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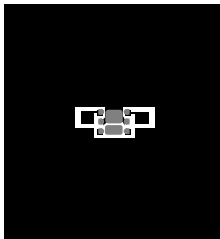
ABSOLUTE MAXIMUM RATINGS (TA = 25°C)

MOSFET1, MOSFET2

Drain to Source Voltage (VGS = 0 V)	V _{DSS}	20	V
Gate to Source Voltage (VDS = 0 V)	V _{GSS}	±12	V
Drain Current (DC) ^{Note1}	I _{D(DC)}	±3.8	A
Drain Current (pulse) ^{Note2}	I _{D(pulse)}	±15.2	A
Total Power Dissipation ^{Note1}	P _T	1.1	W
Channel Temperature	T _{ch}	150	°C
Storage Temperature	T _{stg}	-55 to +150	°C

Notes 1. Mounted on a 1 in² pad of 2 oz copper, 1.5" x 1.5" x 0.062" thick FR-4 board
(Cu pad: 322 mm² x 70 μm, FR-4: 1452 mm² x 1.6 mmt)

2. PW ≤ 10 μs, Duty Cycle ≤ 1%



← FET side: 97°C/W when mounted on a 1 in² pad of 2 oz copper

Not recommend
for new design

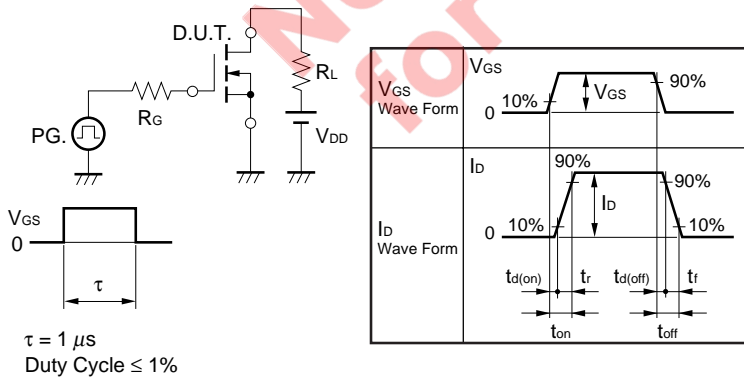
ELECTRICAL CHARACTERISTICS (T_A = 25°C)

MOSFET1, MOSFET2

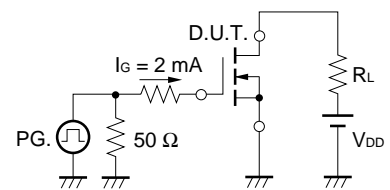
CHARACTERISTICS	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNIT
Zero Gate Voltage Drain Current	I _{DSS}	V _{DS} = 20 V, V _{GS} = 0 V			1	μA
Gate Leakage Current	I _{GSS}	V _{GS} = ±12 V, V _{DS} = 0 V			±10	μA
Gate to Source Threshold Voltage	V _{GS(th)}	V _{DS} = V _{GS} , I _D = 0.25 mA	0.6		2.0	V
Forward Transfer Admittance ^{Note}	y _{fs}	V _{DS} = 10 V, I _D = 1.5 A	1.0	3.6		S
Drain to Source On-state Resistance ^{Note}	R _{DS(on)1}	V _{GS} = 10 V, I _D = 3.0 A	MOSFET1	48	65	mΩ
			MOSFET2	50	65	mΩ
	R _{DS(on)2}	V _{GS} = 4.5 V, I _D = 3.0 A	MOSFET1	55	75	mΩ
			MOSFET2	57	75	mΩ
Input Capacitance	C _{iss}	V _{DS} = 10 V,		220		pF
Output Capacitance	C _{oss}	V _{GS} = 0 V,		100		pF
Reverse Transfer Capacitance	C _{rss}	f = 1.0 MHz		40		pF
Turn-on Delay Time	t _{d(on)}	V _{DD} = 10 V, I _D = 1.5 A,		8.4		ns
Rise Time	t _r	V _{GS} = 4.5 V,		7.3		ns
Turn-off Delay Time	t _{d(off)}	R _G = 10 Ω		15		ns
Fall Time	t _f			3.4		ns
Total Gate Charge	Q _G	V _{DD} = 16 V,		2.9		nC
Gate to Source Charge	Q _{GS}	V _{GS} = 4.5 V,		0.6		nC
Gate to Drain Charge	Q _{GD}	I _D = 3.0 A		1.0		nC
Body Diode Forward Voltage ^{Note}	V _{F(S-D)}	I _F = 3.0 A, V _{GS} = 0 V		0.89		V

Note Pulsed: PW ≤ 350 μs, Duty Cycle ≤ 2%

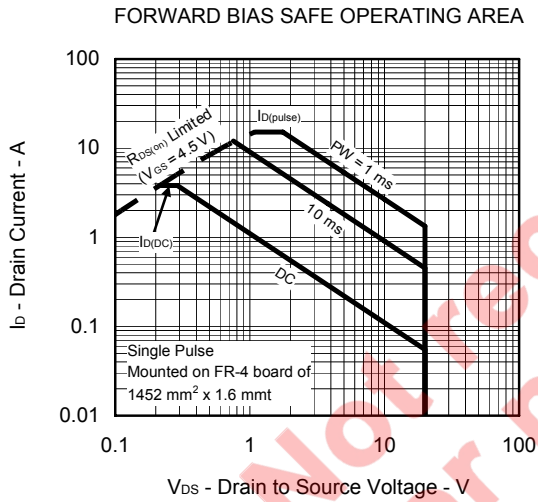
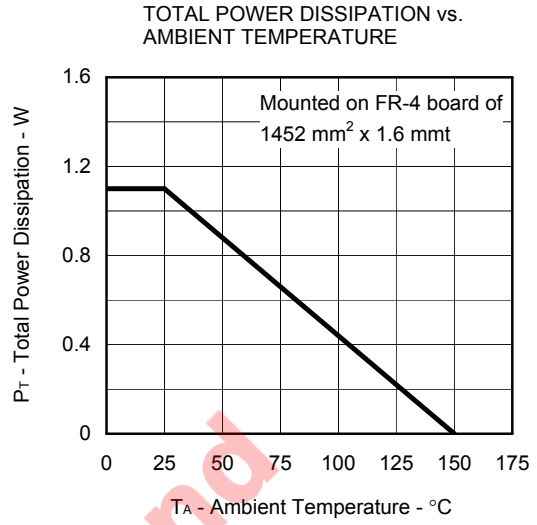
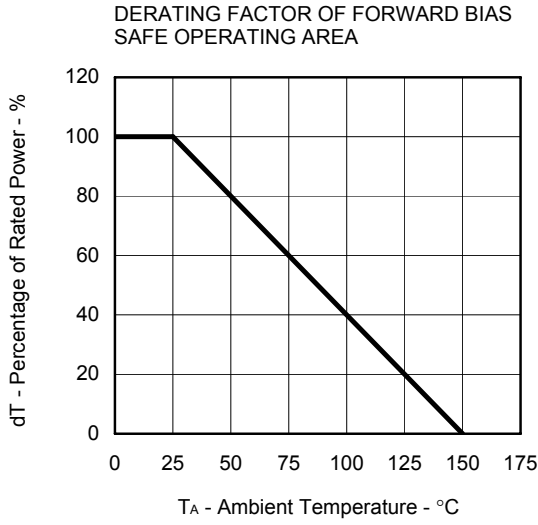
TEST CIRCUIT 1 SWITCHING TIME



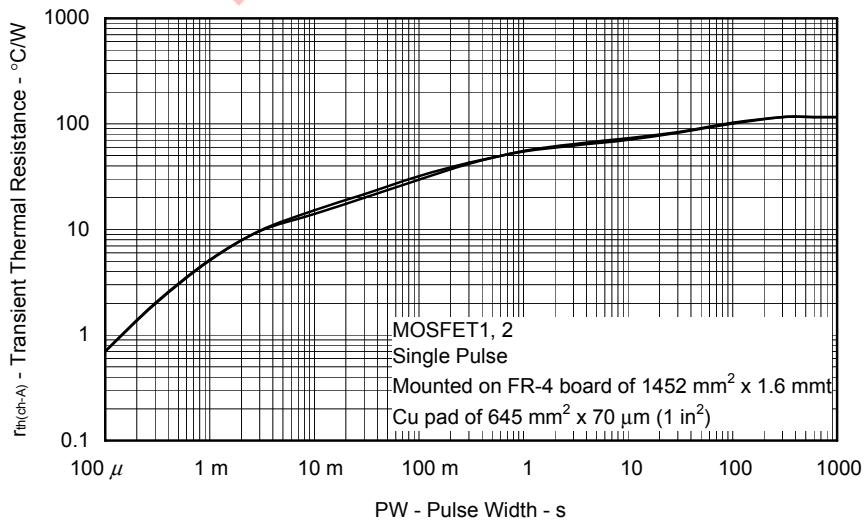
TEST CIRCUIT 2 GATE CHARGE



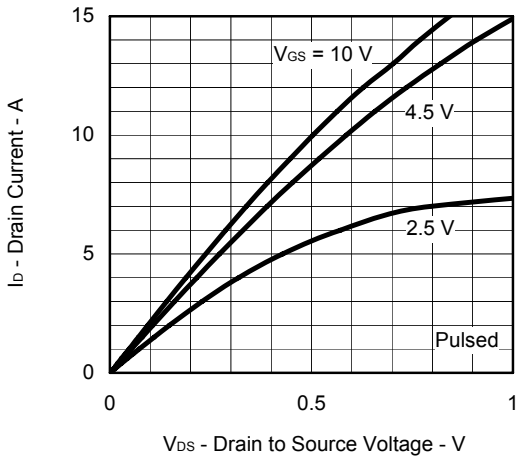
MOSFET TYPICAL CHARACTERISTICS (T_A = 25°C)



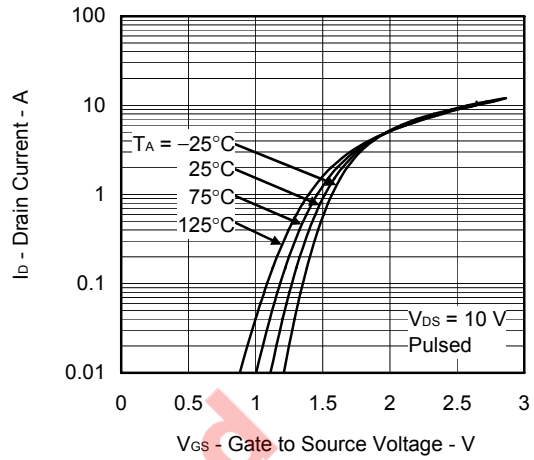
TRANSIENT THERMAL RESISTANCE vs. PULSE WIDTH



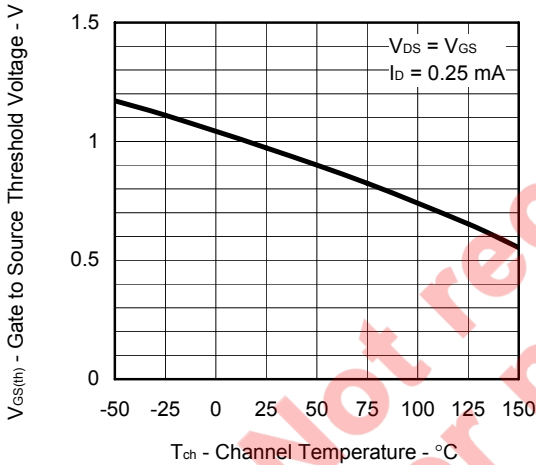
DRAIN CURRENT vs. DRAIN TO SOURCE VOLTAGE



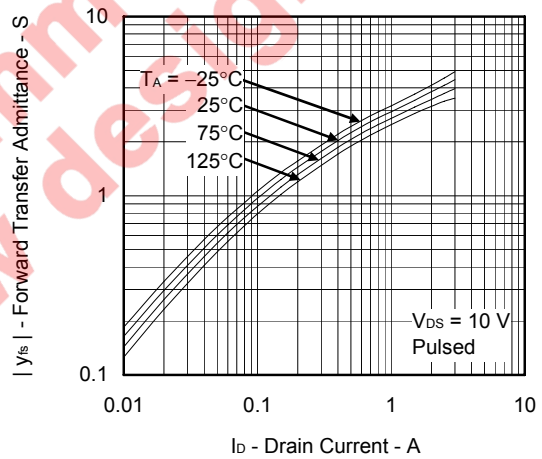
FORWARD TRANSFER CHARACTERISTICS



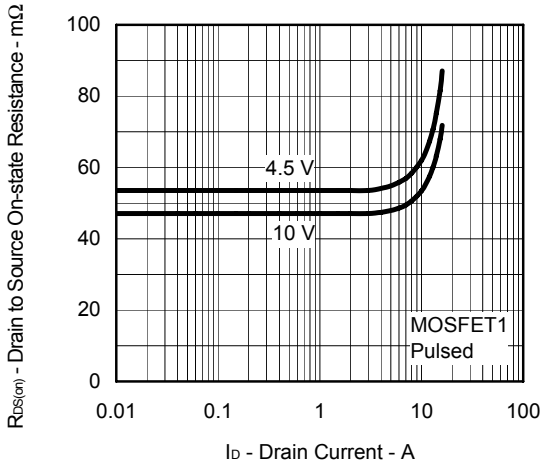
GATE TO SOURCE THRESHOLD VOLTAGE vs. CHANNEL TEMPERATURE



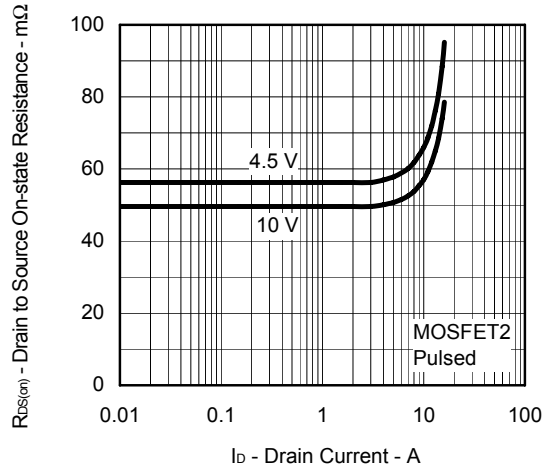
FORWARD TRANSFER ADMITTANCE vs. DRAIN CURRENT



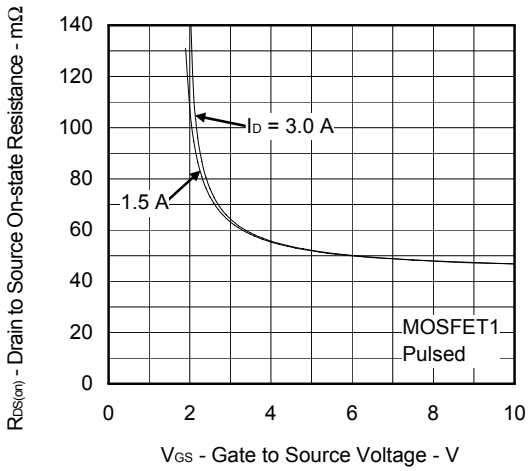
DRAIN TO SOURCE ON-STATE RESISTANCE vs. DRAIN CURRENT



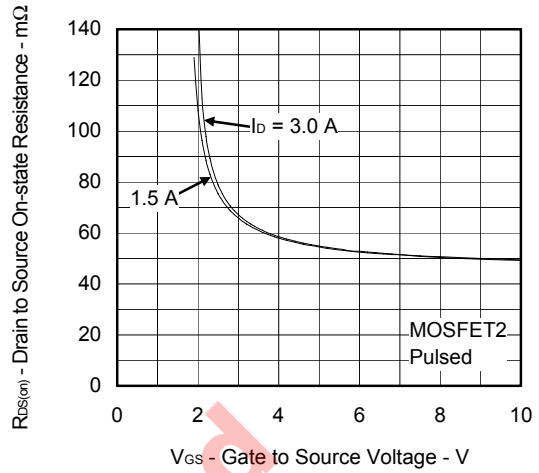
DRAIN TO SOURCE ON-STATE RESISTANCE vs. DRAIN CURRENT



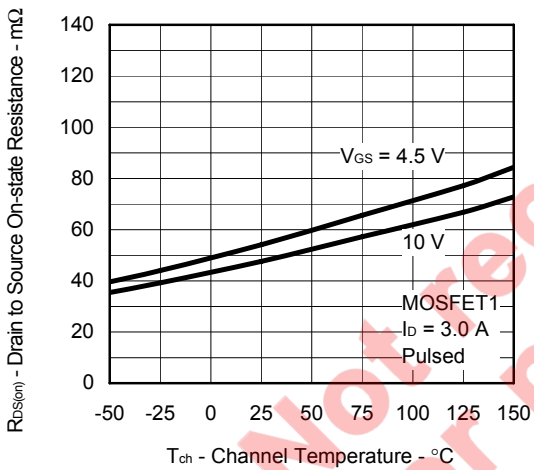
DRAIN TO SOURCE ON-STATE RESISTANCE vs. GATE TO SOURCE VOLTAGE



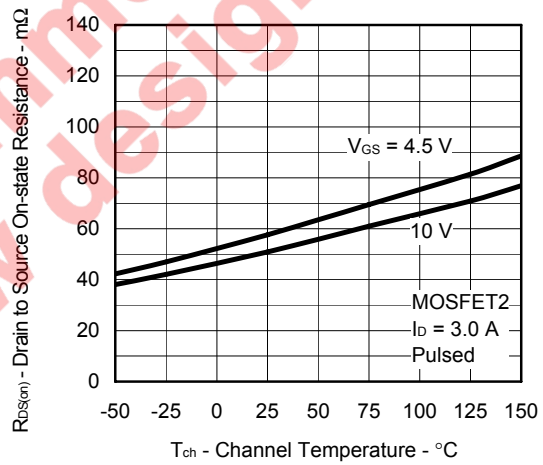
DRAIN TO SOURCE ON-STATE RESISTANCE vs. GATE TO SOURCE VOLTAGE



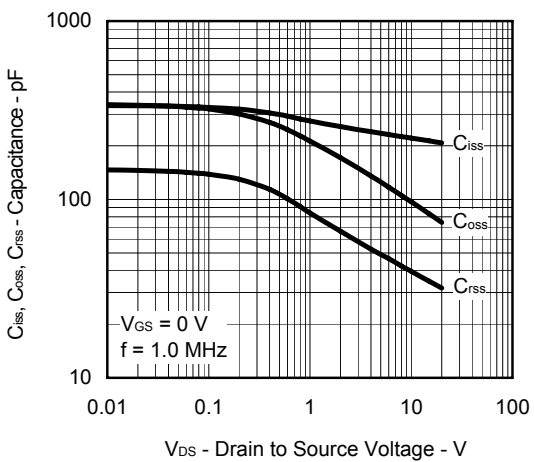
DRAIN TO SOURCE ON-STATE RESISTANCE vs. CHANNEL TEMPERATURE



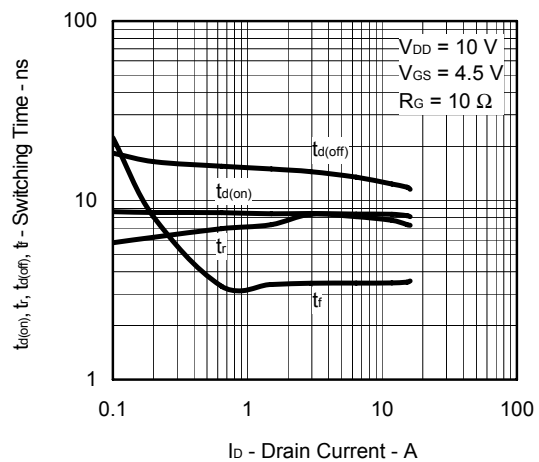
DRAIN TO SOURCE ON-STATE RESISTANCE vs. CHANNEL TEMPERATURE



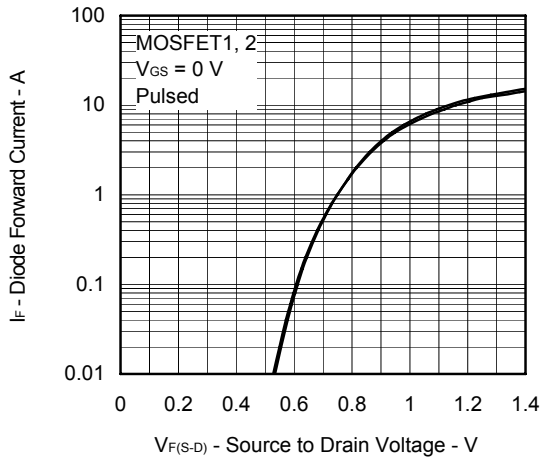
CAPACITANCE vs. DRAIN TO SOURCE VOLTAGE



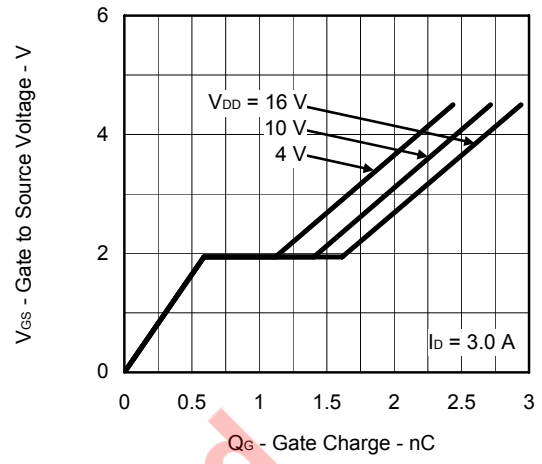
SWITCHING CHARACTERISTICS



SOURCE TO DRAIN DIODE FORWARD VOLTAGE

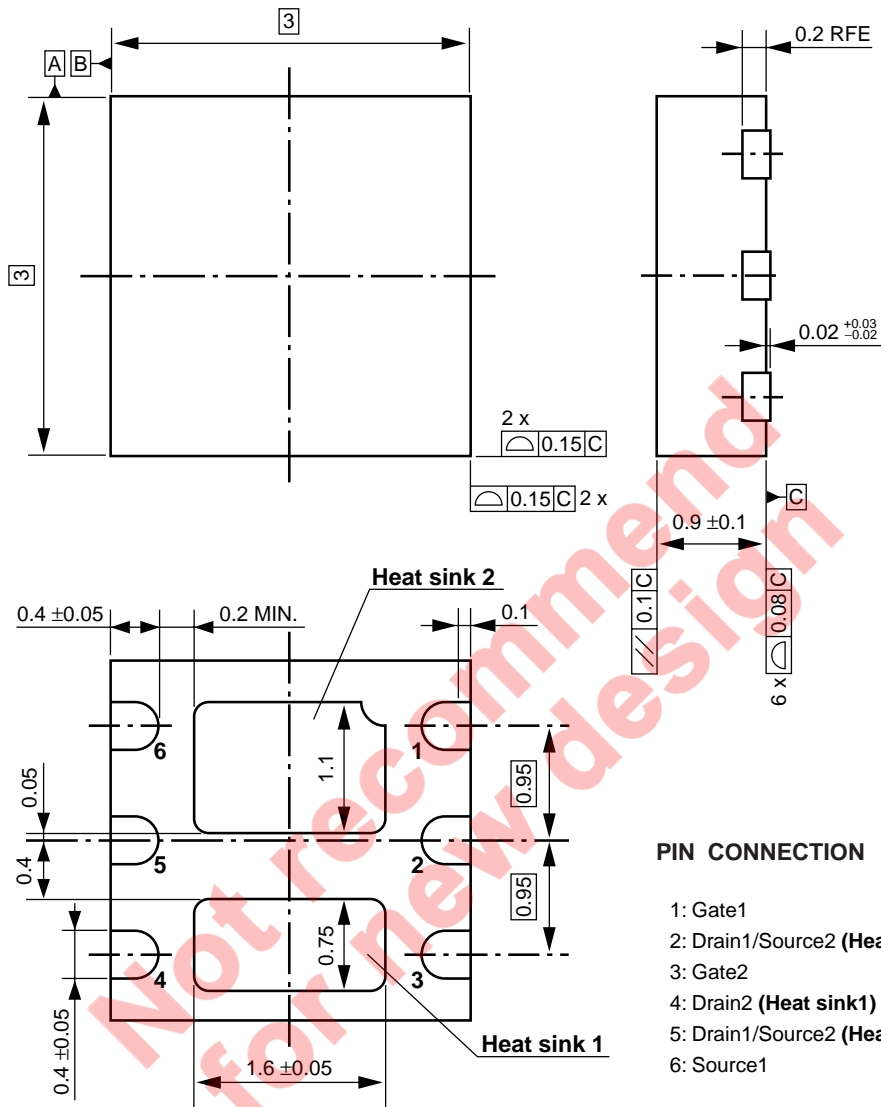


DYNAMIC INPUT CHARACTERISTICS



Not recommended for new design

PACKAGE DRAWING (Unit: mm)



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