

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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**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

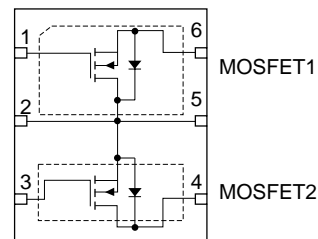
MOSFET1 $R_{DS(on)1} = 48 \text{ m}\Omega$ TYP. ($V_{GS} = 10 \text{ V}$, $I_D = 3.0 \text{ A}$)

$R_{DS(on)2} = 55 \text{ m}\Omega$ 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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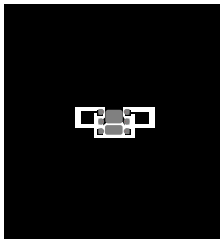
ABSOLUTE MAXIMUM RATINGS (TA = 25°C)

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

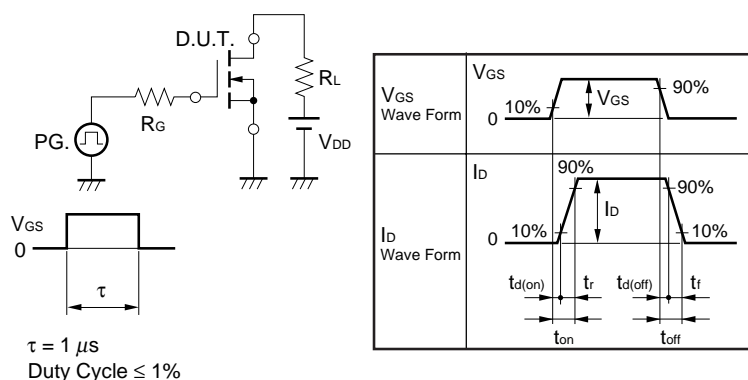
ELECTRICAL CHARACTERISTICS (T_A = 25°C)

MOSFET1, MOSFET2

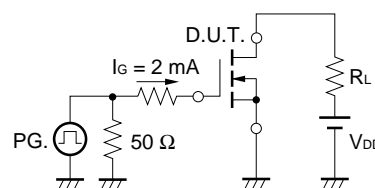
CHARACTERISTICS	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNIT
Zero Gate Voltage Drain Current	I _{DSS}	V _{DS} = 20 V, V _{GS} = 0 V			1	μA
Gate Leakage Current	I _{GSS}	V _{GS} = ±12 V, V _{DS} = 0 V			±10	μA
Gate to Source Threshold Voltage	V _{GS(th)}	V _{DS} = V _{GS} , I _D = 0.25 mA	0.6		2.0	V
Forward 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, V _{GS} = 4.5 V, R _G = 10 Ω		8.4		ns
Rise Time	t _r			7.3		ns
Turn-off Delay Time	t _{d(off)}			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%

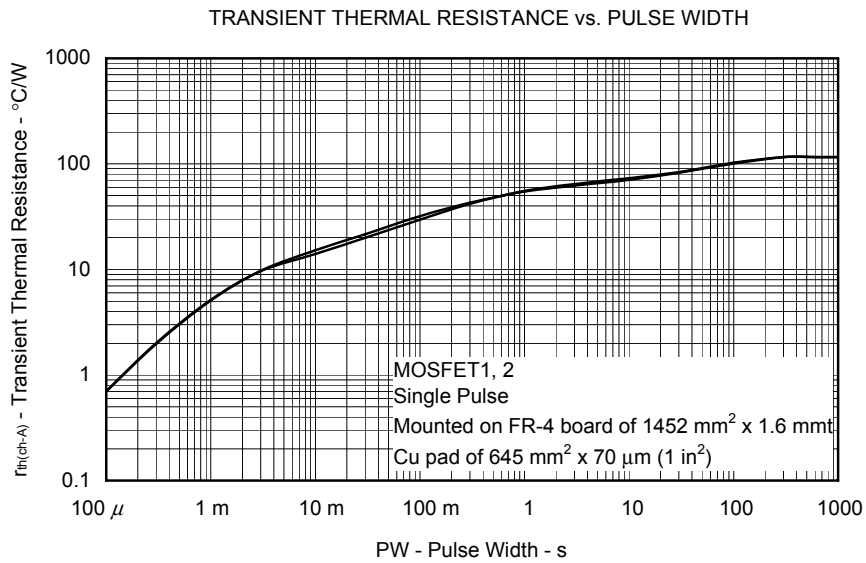
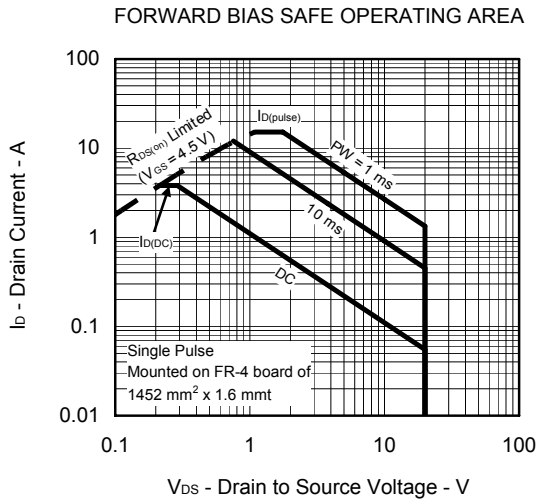
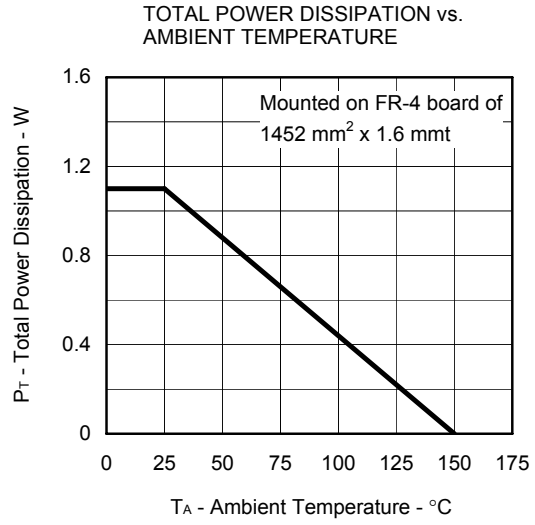
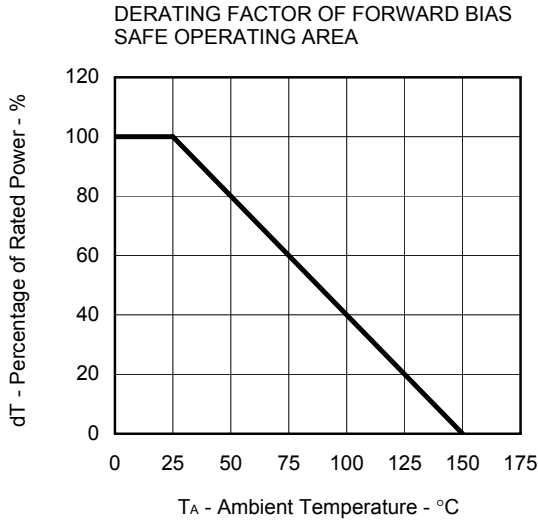
TEST CIRCUIT 1 SWITCHING TIME



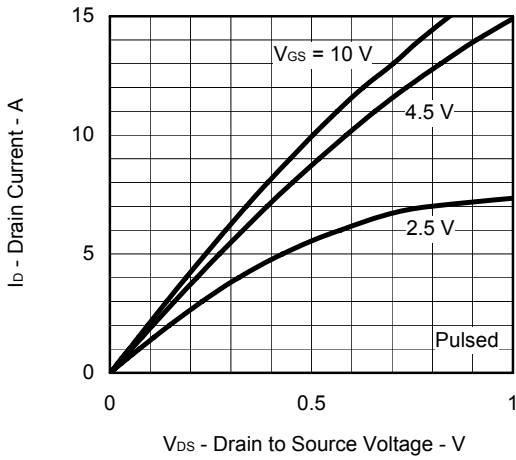
TEST CIRCUIT 2 GATE CHARGE



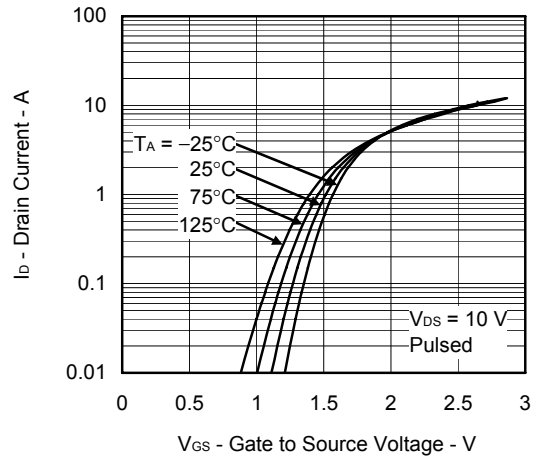
MOSFET TYPICAL CHARACTERISTICS (T_A = 25°C)



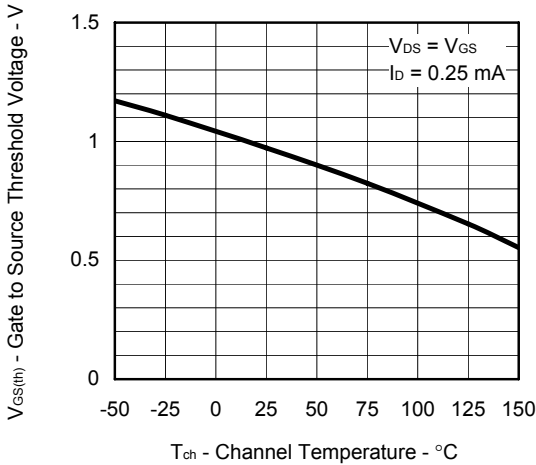
DRAIN CURRENT vs. DRAIN TO SOURCE VOLTAGE



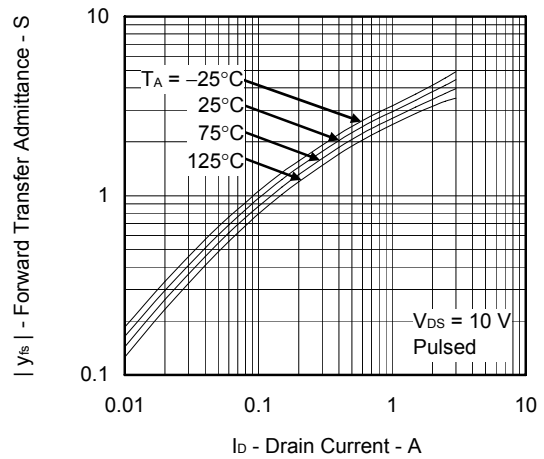
FORWARD TRANSFER CHARACTERISTICS



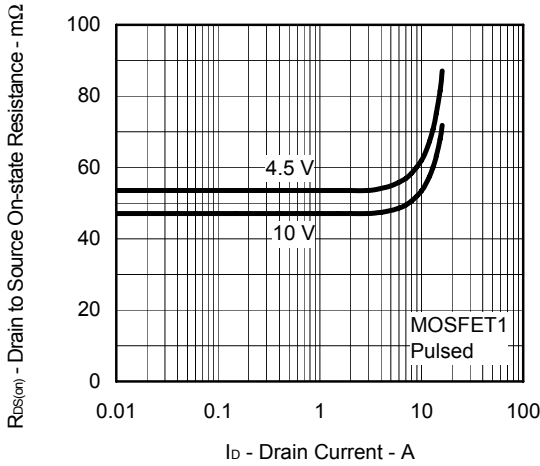
GATE TO SOURCE THRESHOLD VOLTAGE vs. CHANNEL TEMPERATURE



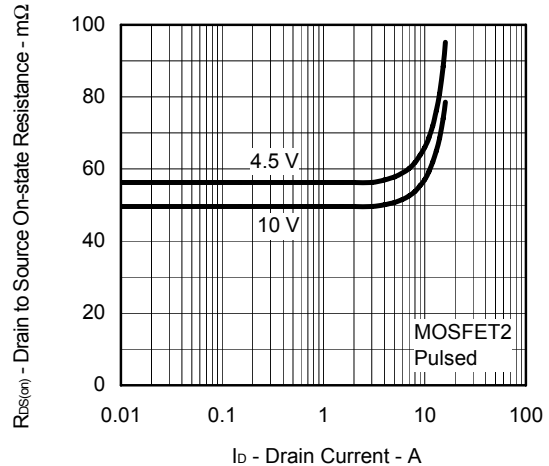
FORWARD TRANSFER ADMITTANCE vs. DRAIN CURRENT



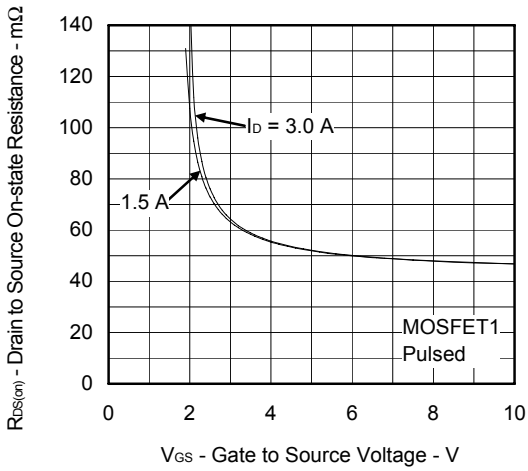
DRAIN TO SOURCE ON-STATE RESISTANCE vs. DRAIN CURRENT



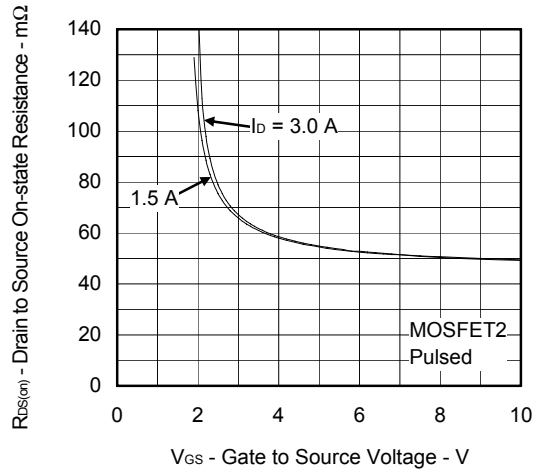
DRAIN TO SOURCE ON-STATE RESISTANCE vs. DRAIN CURRENT



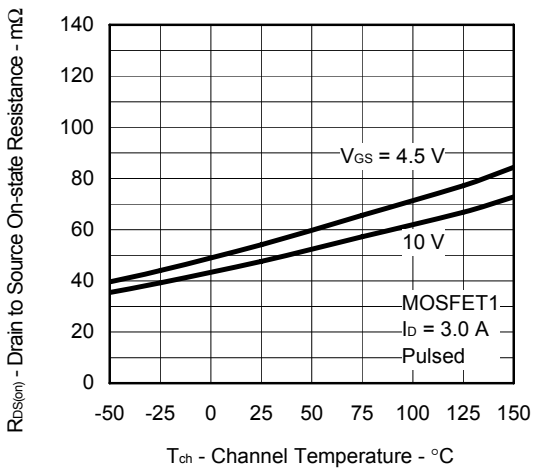
DRAIN TO SOURCE ON-STATE RESISTANCE vs. GATE TO SOURCE VOLTAGE



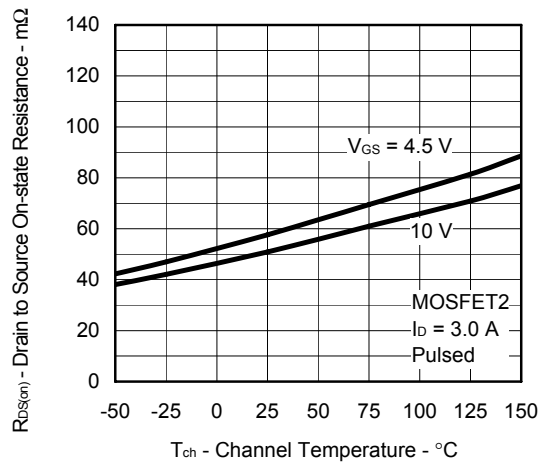
DRAIN TO SOURCE ON-STATE RESISTANCE vs. GATE TO SOURCE VOLTAGE



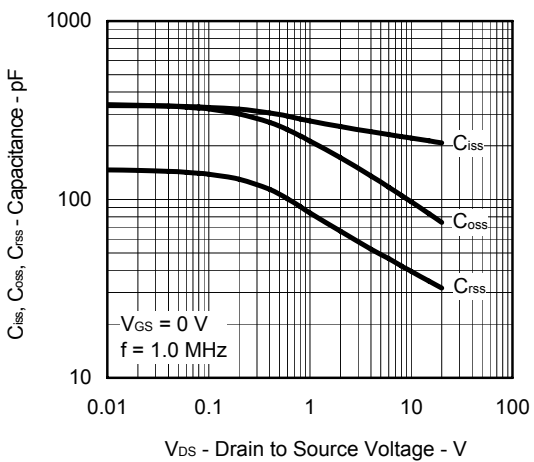
DRAIN TO SOURCE ON-STATE RESISTANCE vs. CHANNEL TEMPERATURE



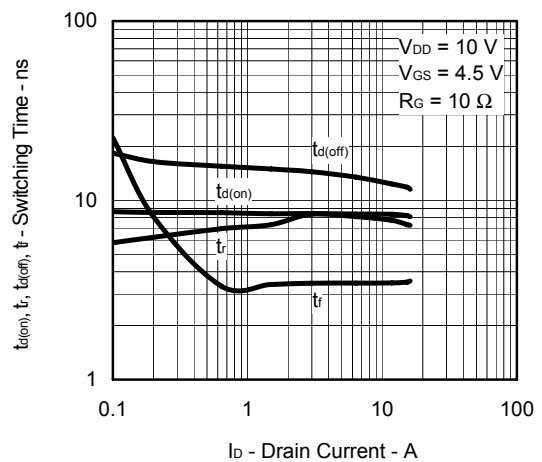
DRAIN TO SOURCE ON-STATE RESISTANCE vs. CHANNEL TEMPERATURE



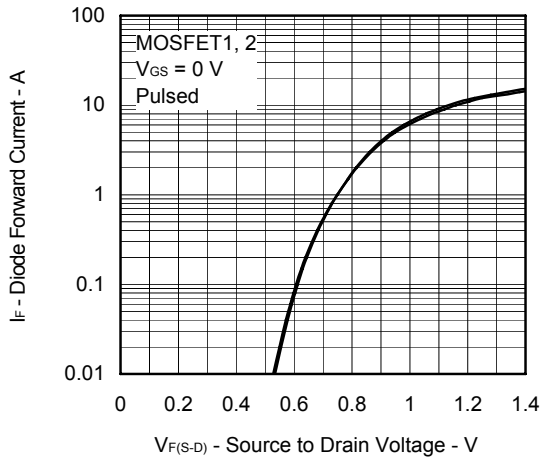
CAPACITANCE vs. DRAIN TO SOURCE VOLTAGE



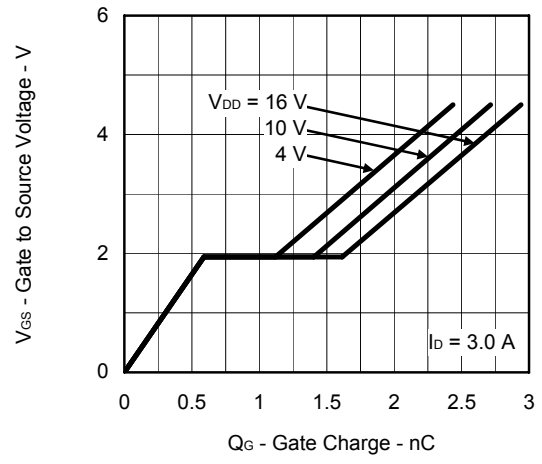
SWITCHING CHARACTERISTICS



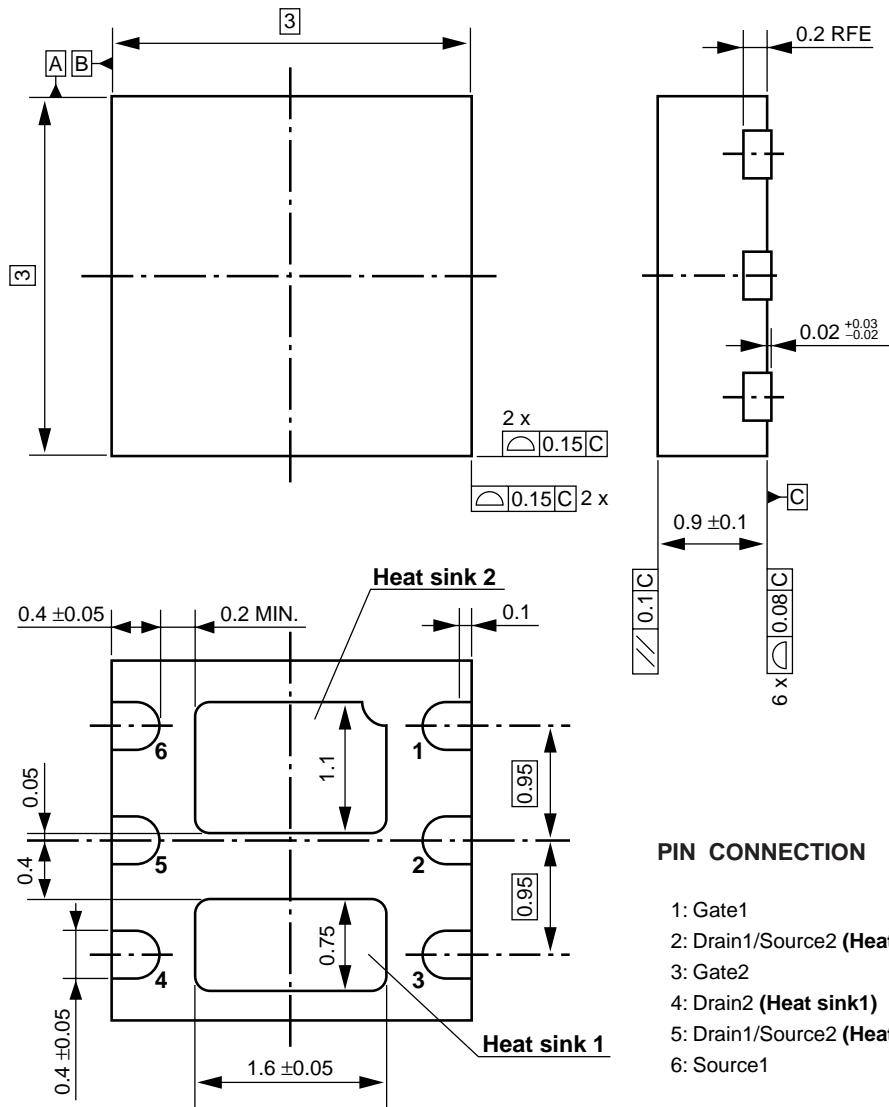
SOURCE TO DRAIN DIODE FORWARD VOLTAGE



DYNAMIC INPUT CHARACTERISTICS



PACKAGE DRAWING (Unit: mm)



PIN CONNECTION

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

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