NEC

MOS FIELD EFFECT TRANSISTOR
μPA2782GR

SWITCHING
N-CHANNEL POWER MOS FET/SCHOTTKY BARRIER DIODE

DESCRIPTION

The μPA2782GR is N-Channel Power MOSFET, which built a Schottky Barrier Diode inside.

This product is designed for synchronous DC/DC converter application.

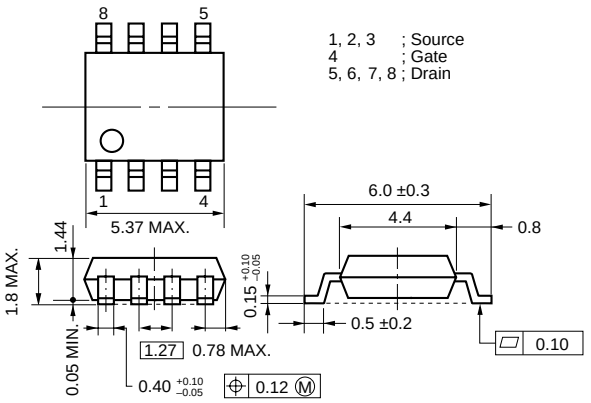
FEATURES

- Built a Schottky Barrier Diode
- Low on-state resistance
  $R_{DS(on)1}$ = 11 mΩ TYP. (V_{GS} = 10 V, I_D = 5.5 A)
  $R_{DS(on)2}$ = 16 mΩ TYP. (V_{GS} = 4.5 V, I_D = 5.5 A)
  $R_{DS(on)3}$ = 19 mΩ TYP. (V_{GS} = 4.0 V, I_D = 5.5 A)
- Low C_{iss}: C_{iss} = 660 pF TYP.
- Small and surface mount package (Power SOP8)

ORDERING INFORMATION

PART NUMBER	PACKAGE
μ PA2782GR	Power SOP8

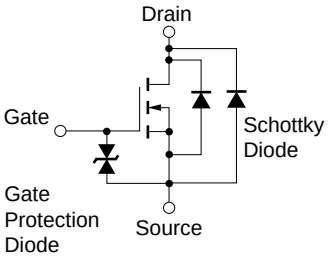
PACKAGE DRAWING (Unit: mm)



ABSOLUTE MAXIMUM RATINGS (T_A = 25°C. All terminals are connected.)

Drain to Source Voltage (V_{GS} = 0 V)	V_{DSS}	30	V
Gate to Source Voltage (V_{DS} = 0 V)	V_{GSS}	±20	V
Drain Current (DC) [MOSFET]	$I_{D(DC)}$	±11	A
Drain Current (pulse) Note1	$I_{D(pulse)}$	±44	A
Average Forward Current Note2 [SCHOTTKY]	$I_{F(AV)}$	2.5	A
Total Power Dissipation Note3 [MOSFET]	P_T	2	W
Total Power Dissipation Note3 [SCHOTTKY]	P_T	1	W
Channel & Junction Temperature	T_{ch}, T_j	150	°C
Storage Temperature	T_{stg}	–55 to + 150	°C

EQUIVALENT CIRCUIT



Notes 1. PW ≤ 10 μs, Duty Cycle ≤ 1%

2. Rectangle wave, 50% Duty Cycle

3. Mounted on ceramic substrate of 1200 mm^2 x 2.2 mm

Caution Strong electric field, when exposed to this device, can cause destruction of the gate oxide and ultimately degrade the device operation. Steps must be taken to stop generation of static electricity as much as possible, and quickly dissipate it once, when it has occurred.

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.

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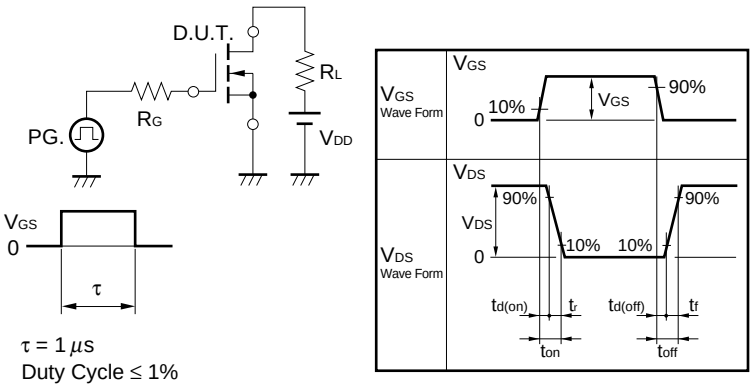
ELECTRICAL CHARACTERISTICS (T_A = 25°C, unless other wise noted. All terminals are connected.)

CHARACTERISTICS	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNIT
Zero Gate Voltage Drain Current [Note]	I_{DSS}	V_{DS} = 24 V, V_{GS} = 0 V			50	μA
		V_{DS} = 24 V, V_{GS} = 0 V, T_A = 125°C			10	mA
Gate Leakage Current	I_{GSS}	V_{GS} = ±20 V, V_{DS} = 0 V			±10	μA
Gate Cut-off Voltage	$V_{GS(off)}$	V_{DS} = 10 V, I_D = 1 mA	1.0		2.5	V
Drain to Source On-state Resistance [Note]	$R_{DS(on)1}$	V_{GS} = 10 V, I_D = 5.5 A		11	15	mΩ
	$R_{DS(on)2}$	V_{GS} = 4.5 V, I_D = 5.5 A		16	22.5	mΩ
	$R_{DS(on)3}$	V_{GS} = 4.0 V, I_D = 5.5 A		19	29	mΩ
Input Capacitance	C_{iss}	V_{DS} = 10 V		660		pF
Output Capacitance	C_{oss}	V_{GS} = 0 V		340		pF
Reverse Transfer Capacitance	C_{rss}	f = 1 MHz		83		pF
Turn-on Delay Time	$t_{d(on)}$	V_{DD} = 15 V, I_D = 5.5 A		9		ns
Rise Time	t_r	V_{GS} = 10 V		5		ns
Turn-off Delay Time	$t_{d(off)}$	R_G = 10 Ω		29		ns
Fall Time	t_f			6		ns
Total Gate Charge	Q_G	V_{DD} = 15 V		7.1		nC
Gate to Source Charge	Q_{GS}	V_{GS} = 5 V		2.1		nC
Gate to Drain Charge	Q_{GD}	I_D = 11 A		3.1		nC
Body Diode Forward Voltage [Note]	$V_{F(S-D)}$	I_F = 1 A, V_{GS} = 0 V		0.45	0.5	V
		I_F = 1 A, V_{GS} = 0 V, T_A = 125°C		0.37		V
Reverse Recovery Time	t_{rr}	I_F = 7 A, V_{GS} = 0 V		25		ns
Reverse Recovery Charge	Q_{rr}	di/dt = 100 A/μs		14		nC

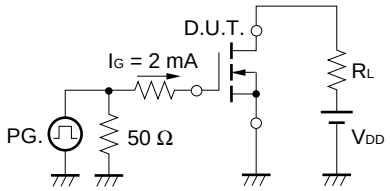
Note Pulsed: PW ≤ 350 μs, Duty Cycle ≤ 2%

TEST CIRCUIT 1 SWITCHING TIME



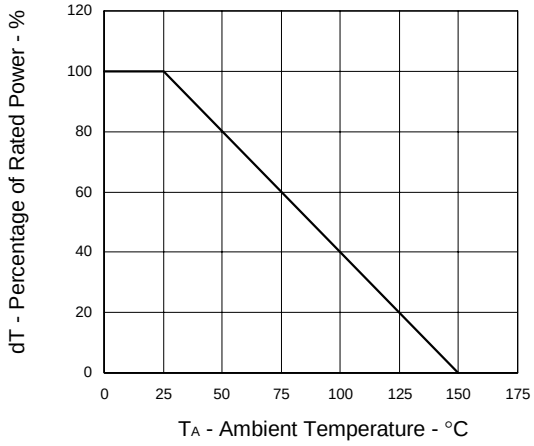
τ = 1 μs
Duty Cycle ≤ 1%

TEST CIRCUIT 2 GATE CHARGE

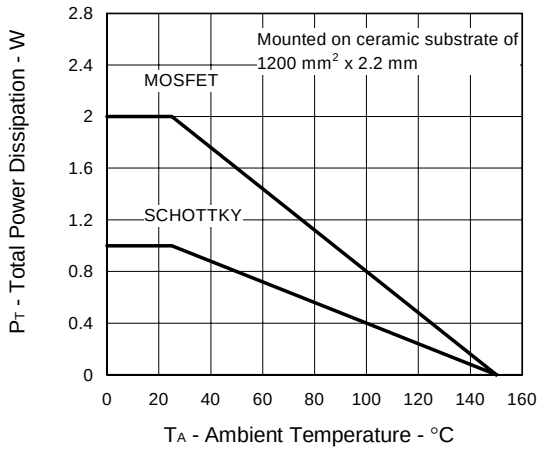


TYPICAL CHARACTERISTICS (T_A = 25°C. All terminals are connected.)

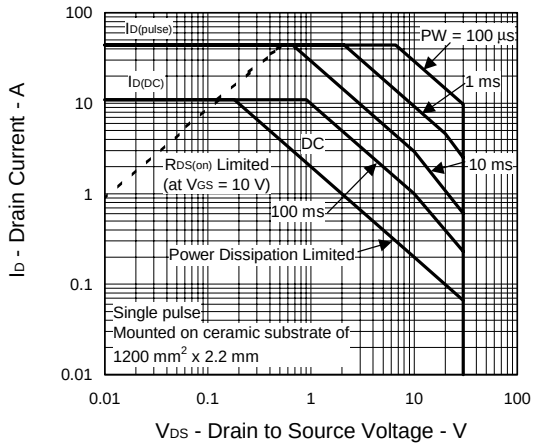
DERATING FACTOR OF FORWARD BIAS SAFE OPERATING AREA



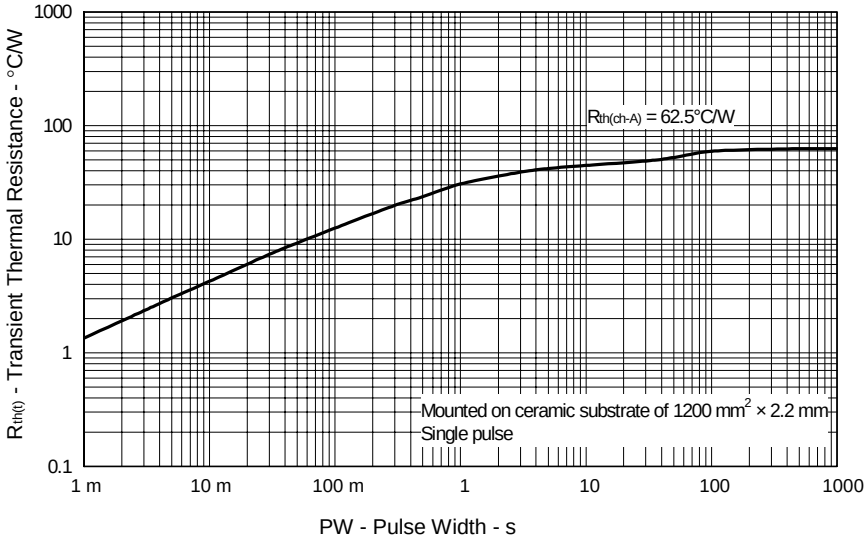
TOTAL POWER DISSIPATION vs. AMBIENT TEMPERATURE



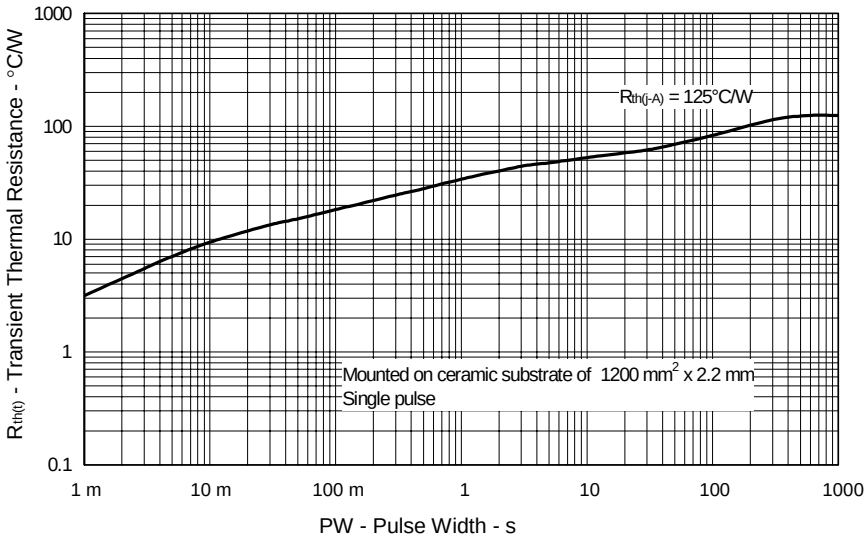
FORWARD BIAS SAFE OPERATING AREA



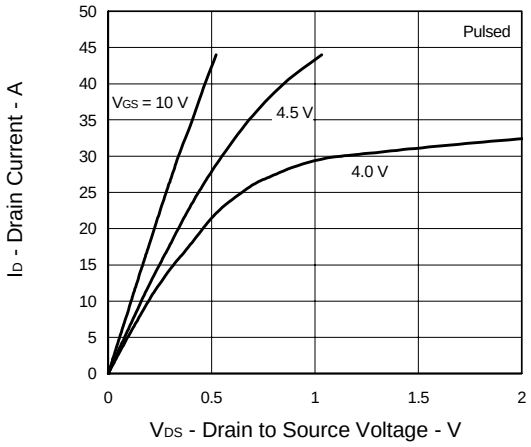
TRANSIENT THERMAL RESISTANCE vs. PULSE WIDTH (MOSFET)



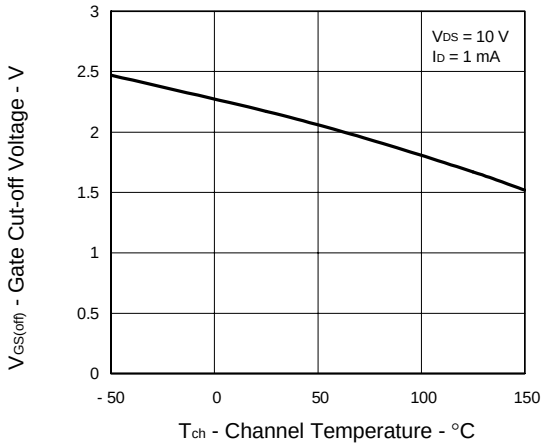
TRANSIENT THERMAL RESISTANCE vs. PULSE WIDTH (SCHOTTKY)



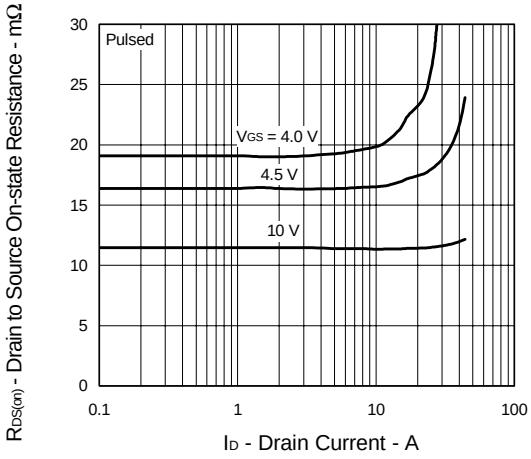
DRAIN CURRENT vs.
DRAIN TO SOURCE VOLTAGE



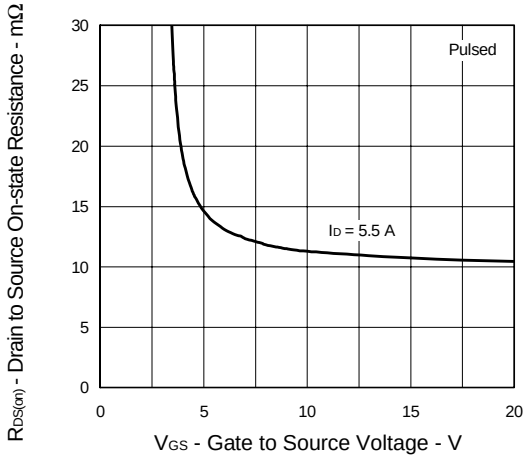
GATE CUT-OFF VOLTAGE vs.
CHANCEL TEMPERATURE



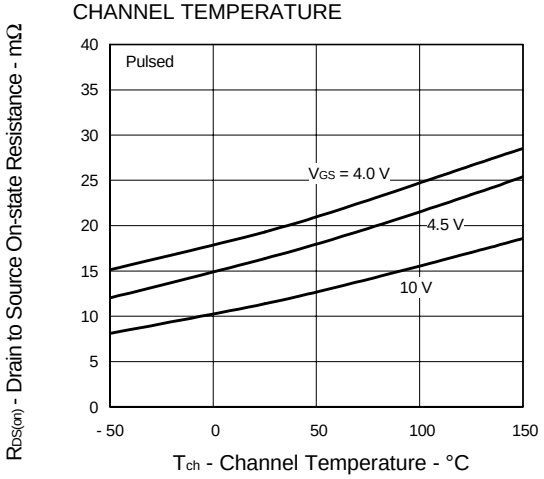
DRAIN TO SOURCE ON-STATE RESISTANCE vs.
DRAIN CURRENT



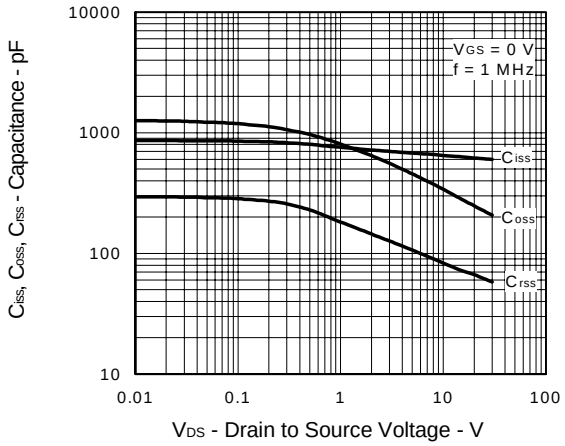
DRAIN TO SOURCE ON-STATE RESISTANCE vs.
GATE TO SOURCE VOLTAGE



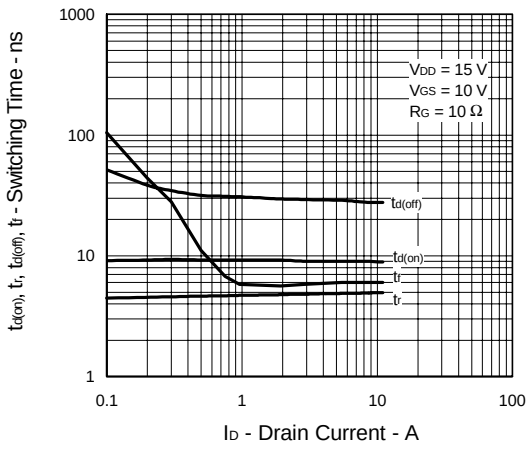
DRAIN TO SOURCE ON-STATE RESISTANCE vs. CHANNEL TEMPERATURE



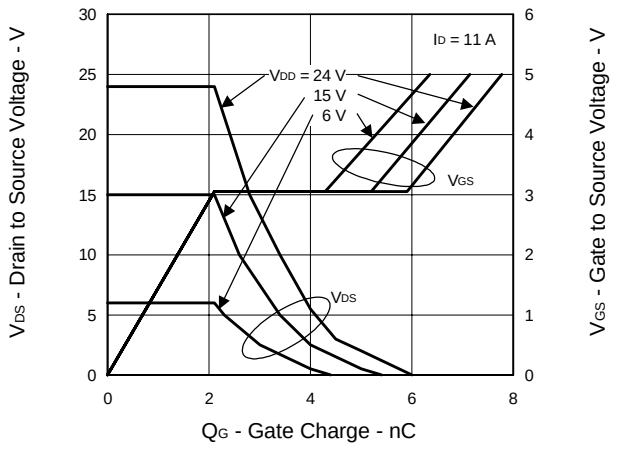
CAPACITANCE vs. DRAIN TO SOURCE VOLTAGE



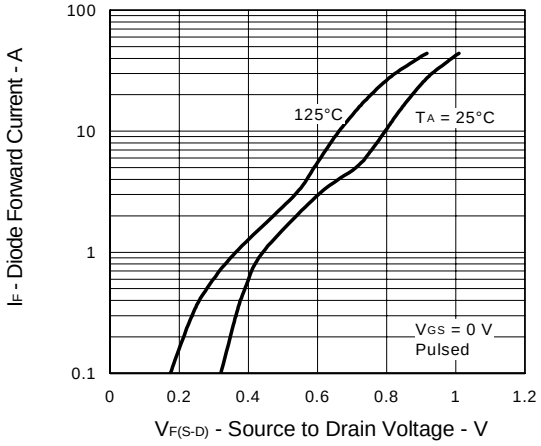
SWITCHING CHARACTERISTICS



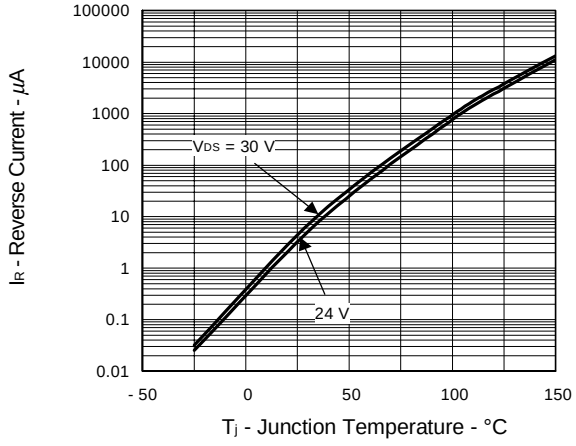
DYNAMIC INPUT/OUTPUT CHARACTERISTICS



SOURCE TO DRAIN DIODE FORWARD VOLTAGE



SOURCE TO DRAIN DIODE REVERSE CURRENT



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