

SWITCHING  
N-CHANNEL POWER MOS FET  
INDUSTRIAL USE

DESCRIPTION

This product is N-Channel MOS Field Effect Transistor designed for DC/DC converter and power management applications of note book computers.

FEATURES

- Low On-Resistance  
 $R_{DS(on)1} = 27 \text{ m}\Omega$  Typ. ( $V_{GS} = 10 \text{ V}$ ,  $I_D = 3.5 \text{ A}$ )  
 $R_{DS(on)2} = 50 \text{ m}\Omega$  Typ. ( $V_{GS} = 4 \text{ V}$ ,  $I_D = 3.5 \text{ A}$ )
- Low  $C_{iss}$   $C_{iss} = 850 \text{ pF}$  Typ.
- Built-in G-S Protection Diode
- Small and Surface Mount Package (Power SOP8)

ORDERING INFORMATION

PART NUMBER	PACKAGE
$\mu$ PA1700G	Power SOP8

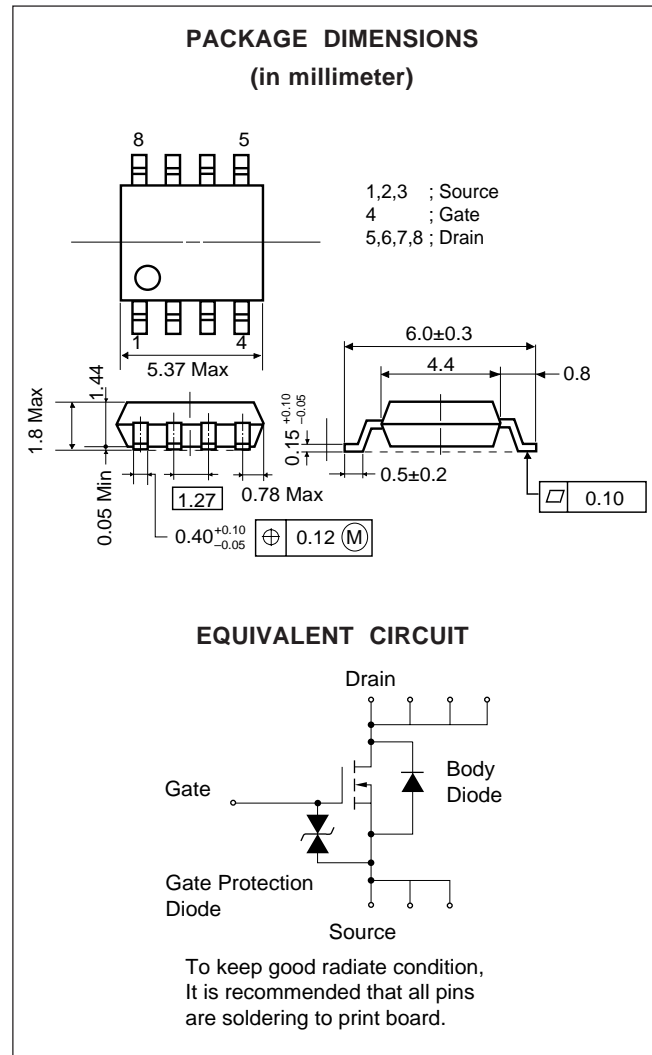
ABSOLUTE MAXIMUM RATINGS ( $T_A = 25 \text{ }^\circ\text{C}$ )

Drain to Source Voltage	$V_{DSS}$	30	V
Gate to Source Voltage	$V_{GDS}$	$\pm 20$	V
Drain Current (DC)	$I_{D(DC)}$	$\pm 7.0$	A
Drain Current (pulse)*	$I_{D(pulse)}$	$\pm 28$	A
Total Power Dissipation	$P_T$	2.0	W
$(T_A = 25 \text{ }^\circ\text{C})^{**}$			
Channel Temperature	$T_{CH}$	150	$^\circ\text{C}$
Storage Temperature	$T_{stg}$	-55 to +150	$^\circ\text{C}$

\*  $PW \leq 10 \text{ } \mu\text{s}$ , Duty Cycle  $\leq 1 \%$

\*\* Mounted on ceramic substate of  $1200 \text{ mm}^2 \times 0.7 \text{ mm}$

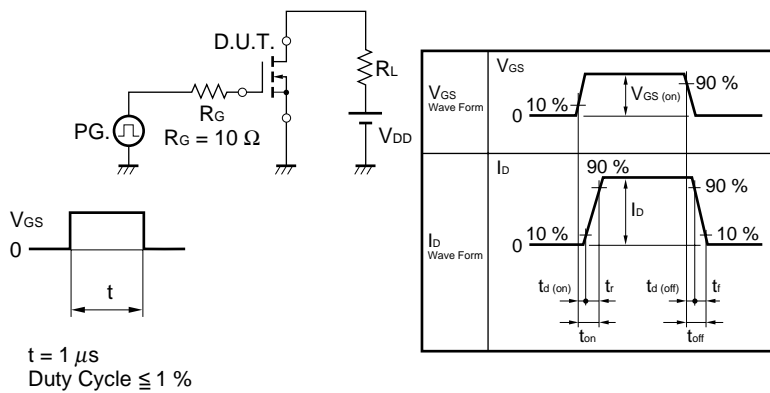
The diode connected between the gate and source of the transistor serves as a protector against ESD. When this device is actually used, an additional protection circuit is externally required if a voltage exceeding the rated voltage may be applied to this device.



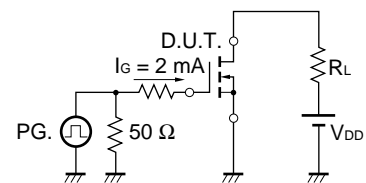
**ELECTRICAL CHARACTERISTICS (T<sub>A</sub> = 25 °C)**

CHARACTERISTICS	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNIT
Drain to Source On-state Resistance	R <sub>DS(on)1</sub>	V <sub>GS</sub> = 10 V, I <sub>D</sub> = 3.5 A		20	27	mΩ
	R <sub>DS(on)2</sub>	V <sub>GS</sub> = 4 V, I <sub>D</sub> = 3.5 A		33	50	mΩ
Gate to Source Cutoff Voltage	V <sub>GS(off)</sub>	V <sub>DS</sub> = 10 V, I <sub>D</sub> = 1 mA	1.0	1.6	2.0	V
Forward Transfer Admittance	y <sub>fs</sub>	V <sub>DS</sub> = 10 V, I <sub>D</sub> = 3.5 A	5.0			S
Drain Leakage Current	I <sub>DSS</sub>	V <sub>DS</sub> = 30 V, V <sub>GS</sub> = 0			10	μA
Gate to Source Leakage Current	I <sub>GSS</sub>	V <sub>GS</sub> = ±20 V, V <sub>DS</sub> = 0			±10	μA
Input Capacitance	C <sub>iss</sub>	V <sub>DS</sub> = 10 V		850		pF
Output Capacitance	C <sub>oss</sub>	V <sub>GS</sub> = 0		550		pF
Reverse Transfer Capacitance	C <sub>rss</sub>	f = 1 MHz		270		pF
Turn-On Delay Time	t <sub>d(on)</sub>	I <sub>D</sub> = 3.5 A		20		ns
Rise Time	t <sub>r</sub>	V <sub>GS(on)</sub> = 10 V		105		ns
Turn-Off Delay Time	t <sub>d(off)</sub>	V <sub>DD</sub> = 15 V		90		ns
Fall Time	t <sub>f</sub>	R <sub>G</sub> = 10 Ω		60		ns
Total Gate Charge	Q <sub>G</sub>	I <sub>D</sub> = 7.0 A		33		nC
Gate to Source Charge	Q <sub>GS</sub>	V <sub>DD</sub> = 24 V		2.4		nC
Gate to Drain Charge	Q <sub>GD</sub>	V <sub>GS</sub> = 10 V		13		nC
Body Diode Forward Voltage	V <sub>F(S-D)</sub>	I <sub>F</sub> = 7.0 A, V <sub>GS</sub> = 0		0.84		V
Reverse Recovery Time	t <sub>rr</sub>	I <sub>F</sub> = 7.0 A, V <sub>GS</sub> = 0		60		ns
Reverse Recovery Charge	Q <sub>rr</sub>	di/dt = 100 A/μs		90		nC

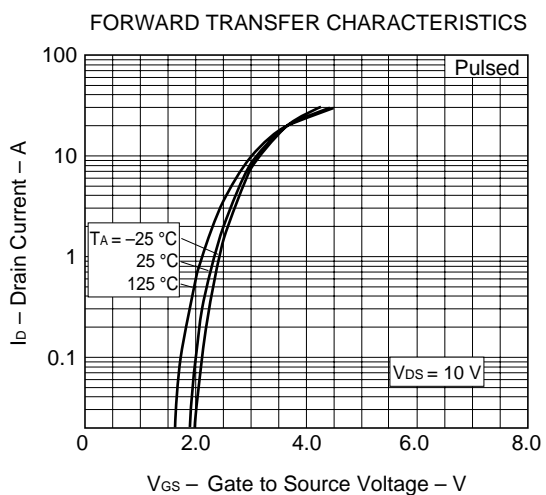
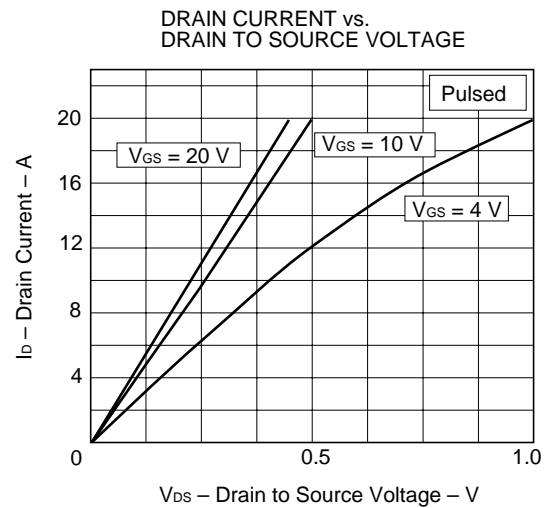
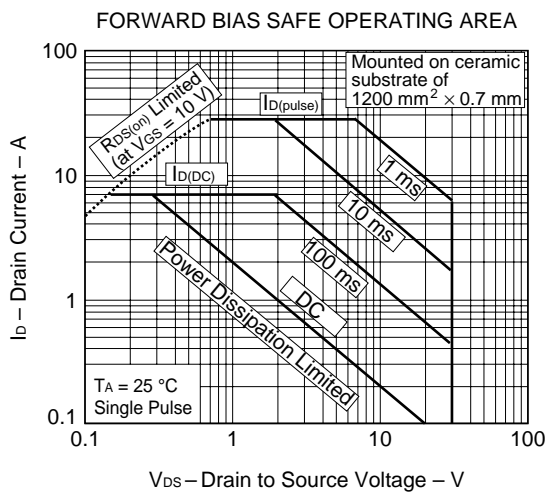
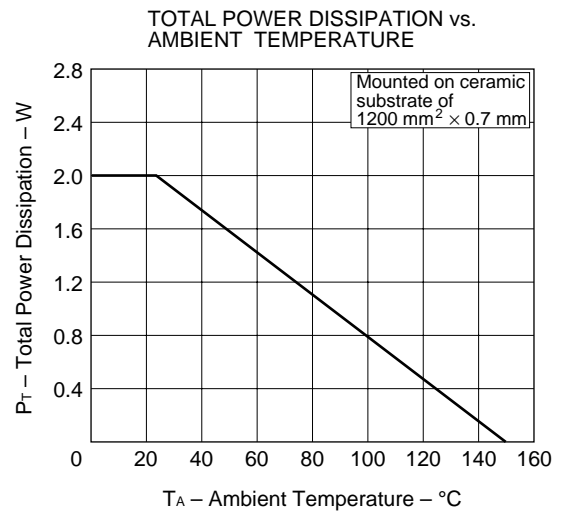
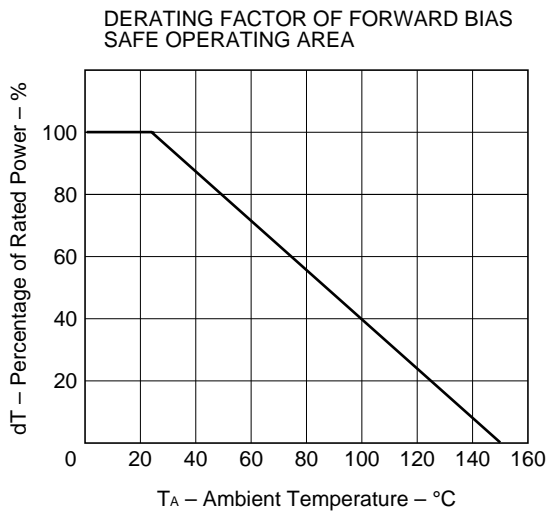
**Test Circuit 1 Switching Time**



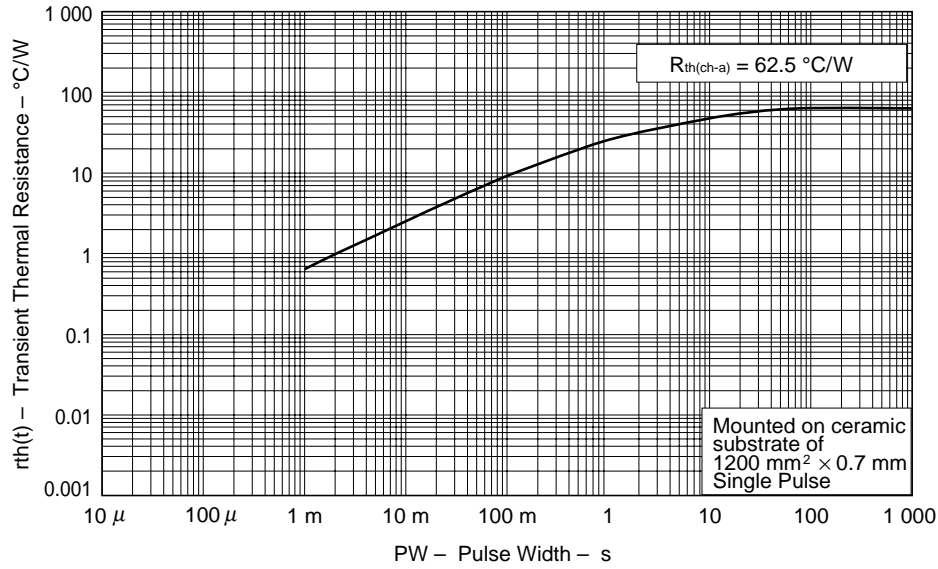
**Test Circuit 2 Gate Charge**



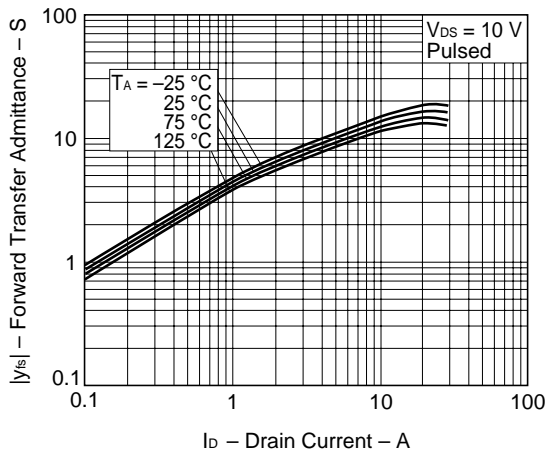
TYPICAL CHARACTERISTICS ( $T_A = 25\text{ }^\circ\text{C}$ )



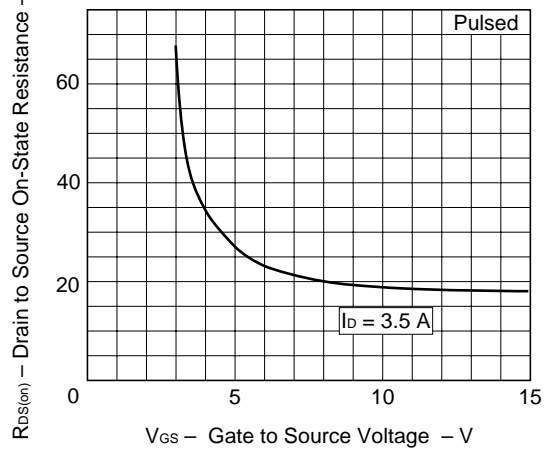
TRANSIENT THERMAL RESISTANCE vs. PULSE WIDTH



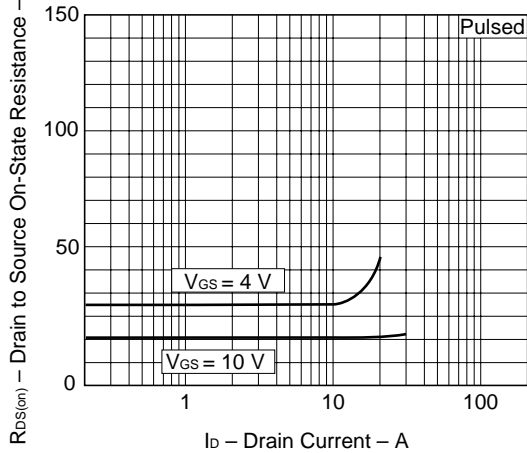
FORWARD TRANSFER ADMITTANCE vs. DRAIN CURRENT



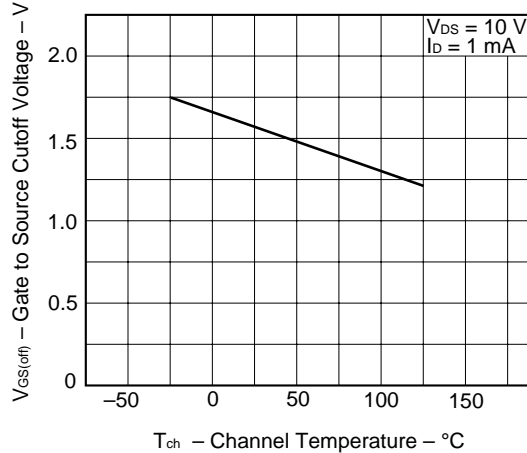
DRAIN TO SOURCE ON-STATE RESISTANCE vs. GATE TO SOURCE VOLTAGE

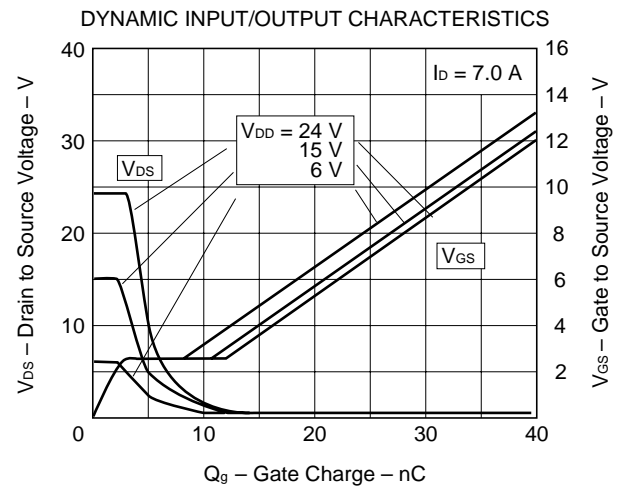
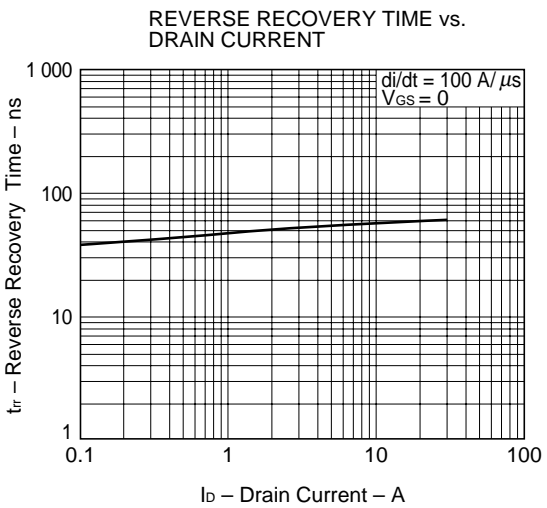
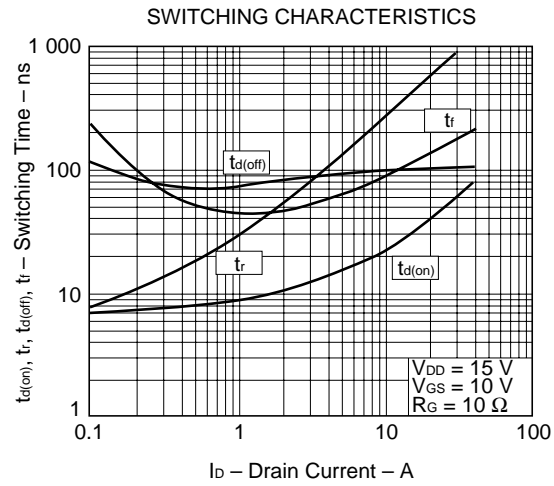
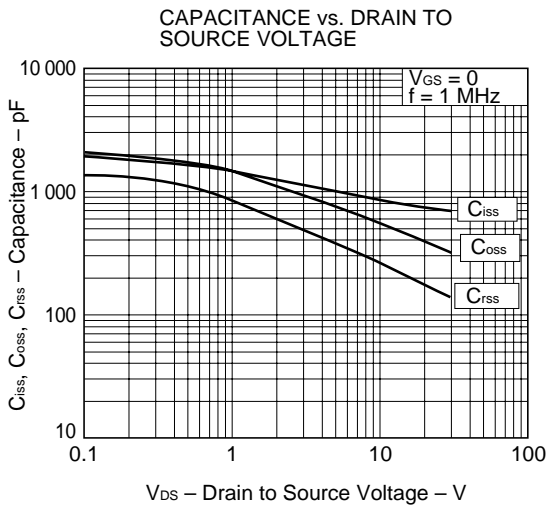
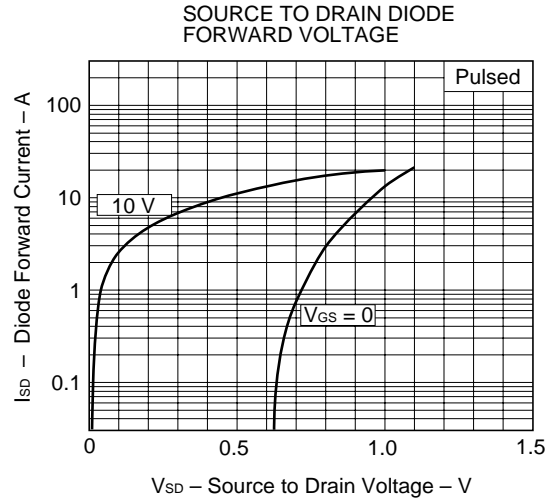
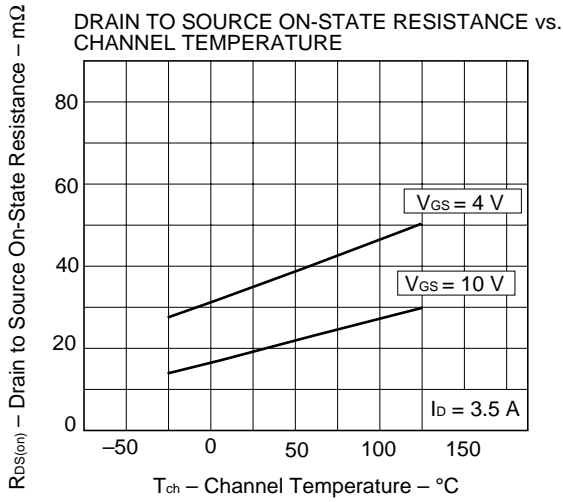


DRAIN TO SOURCE ON-STATE RESISTANCE vs. DRAIN CURRENT



GATE TO SOURCE CUTOFF VOLTAGE vs. CHANNEL TEMPERATURE





## REFERENCE

Document Name	Document No.
NEC semiconductor device reliability/quality control system	TEI-1202
Quality grade on NEC semiconductor devices	IEI-1209
Semiconductor device mounting technology manual	IEI-1207
Semiconductor device package manual	IEI-1213
Guide to quality assurance for semiconductor devices	MEI-1202
Semiconductor selection guide	MF-1134
Power MOS FET features and application switching power supply	TEA-1034
Application circuits using Power MOS FET	TEA-1035
Safe operating area of Power MOS FET	TEA-1037

[MEMO]

## [MEMO]

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Anti-radioactive design is not implemented in this product.