

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

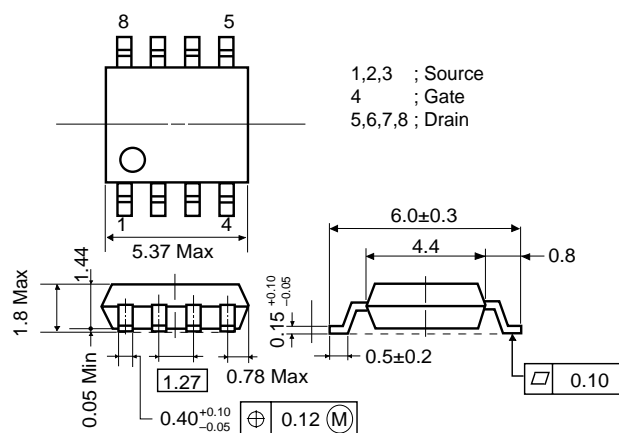
Drain to Source Voltage	$V_{DSS}$	30	V
Gate to Source Voltage	$V_{GDS}$	$\pm 20$	V
Drain Current (DC)	$I_{D(DC)}$	$\pm 7.0$	A
Drain Current (pulse)*	$I_{D(pulse)}$	$\pm 28$	A
Total Power Dissipation	$P_T$	2.0	W
( $T_A = 25^\circ \text{C}$ )**			
Channel Temperature	$T_{CH}$	150	$^\circ \text{C}$
Storage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

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

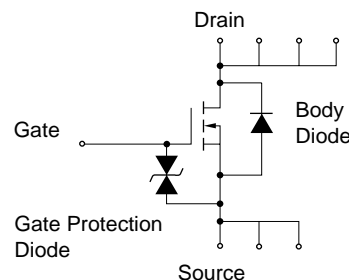
\*\* Mounted on ceramic substate of  $1200 \text{ mm}^2 \times 0.7 \text{ mm}$

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.

### PACKAGE DIMENSIONS (in millimeter)



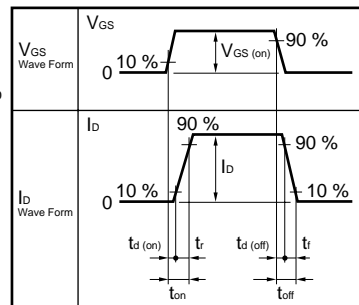
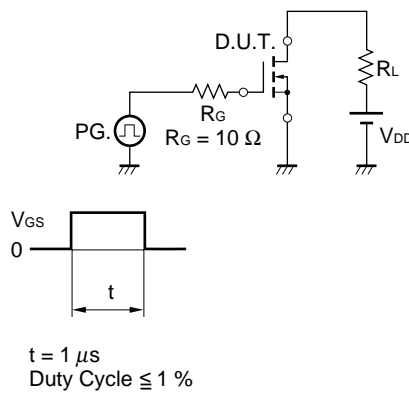
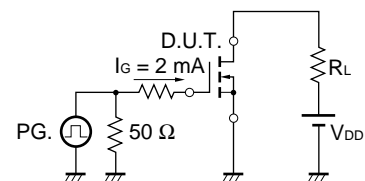
### EQUIVALENT CIRCUIT



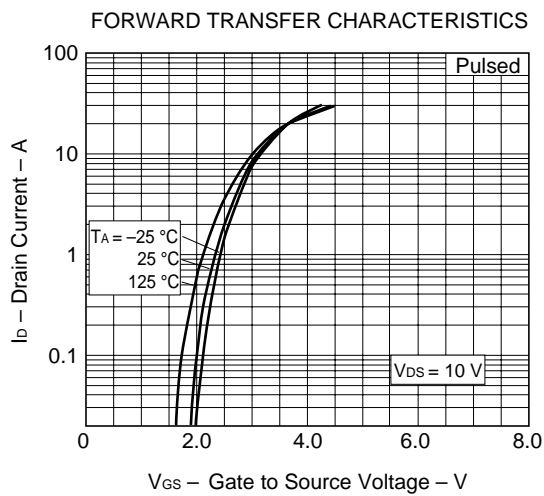
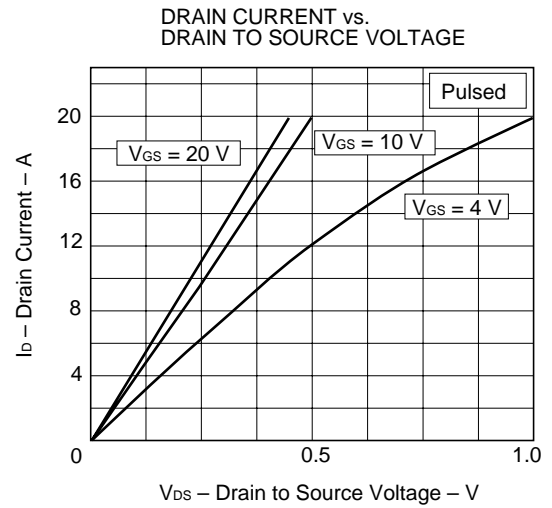
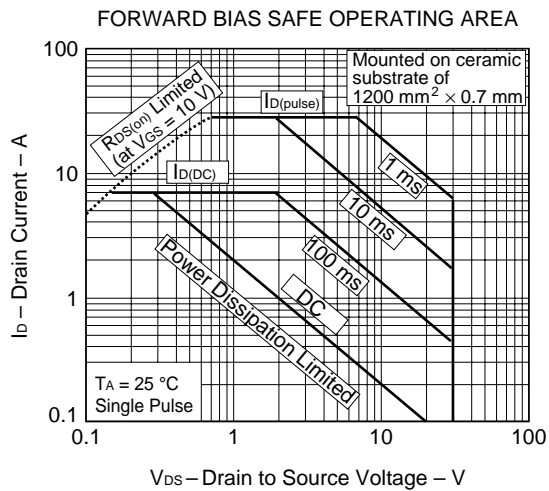
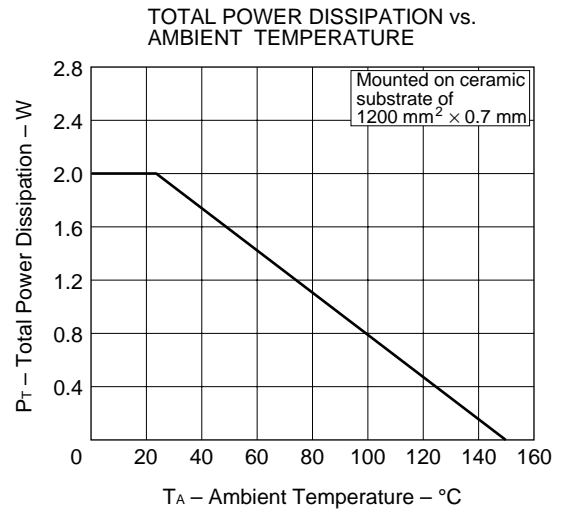
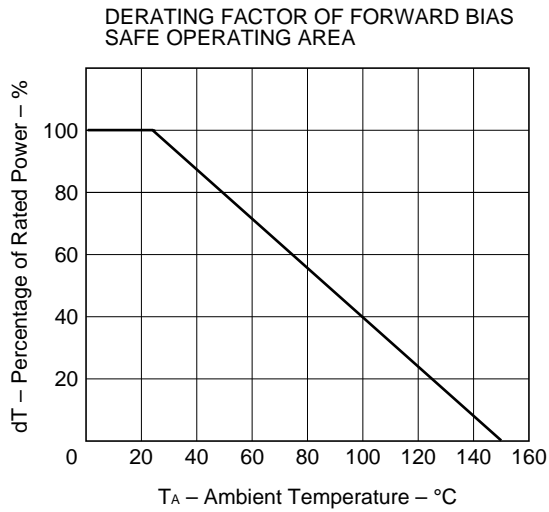
To keep good radiate condition,  
It is recommended that all pins  
are soldering to print board.

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

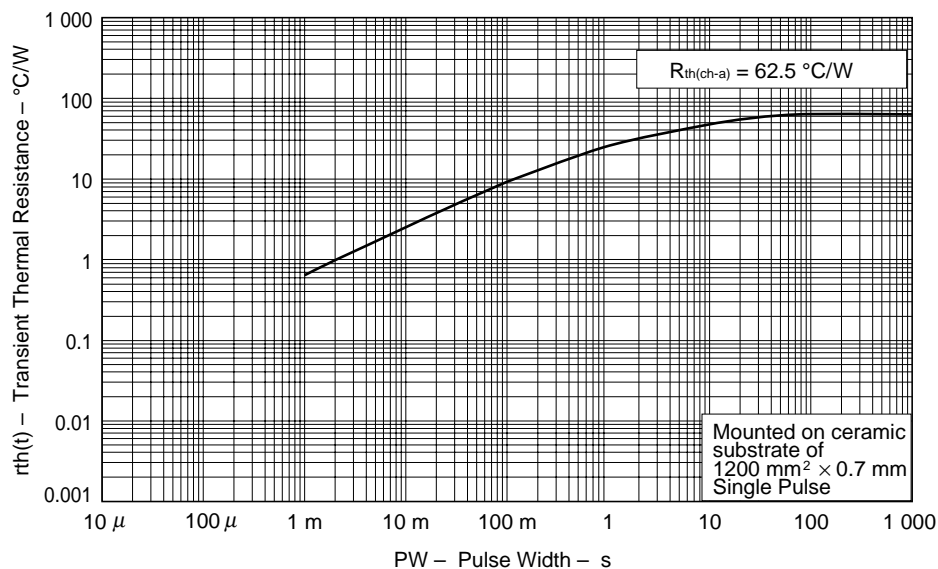
CHARACTERISTICS	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNIT
Drain to Source On-state Resistance	$R_{DS(on)1}$	$V_{GS} = 10\text{ V}, I_D = 3.5\text{ A}$		20	27	$\text{m}\Omega$
	$R_{DS(on)2}$	$V_{GS} = 4\text{ V}, I_D = 3.5\text{ A}$		33	50	$\text{m}\Omega$
Gate to Source Cutoff Voltage	$V_{GS(off)}$	$V_{DS} = 10\text{ V}, I_D = 1\text{ mA}$	1.0	1.6	2.0	V
Forward Transfer Admittance	$ y_{fs} $	$V_{DS} = 10\text{ V}, I_D = 3.5\text{ A}$	5.0			S
Drain Leakage Current	$I_{DSS}$	$V_{DS} = 30\text{ V}, V_{GS} = 0$			10	$\mu\text{A}$
Gate to Source Leakage Current	$I_{GSS}$	$V_{GS} = \pm 20\text{ V}, V_{DS} = 0$			$\pm 10$	$\mu\text{A}$
Input Capacitance	$C_{iss}$	$V_{DS} = 10\text{ V}$		850		pF
Output Capacitance	$C_{oss}$	$V_{GS} = 0$		550		pF
Reverse Transfer Capacitance	$C_{rss}$	$f = 1\text{ MHz}$		270		pF
Turn-On Delay Time	$t_{d(on)}$	$I_D = 3.5\text{ A}$		20		ns
Rise Time	$t_r$	$V_{GS(on)} = 10\text{ V}$		105		ns
Turn-Off Delay Time	$t_{d(off)}$	$V_{DD} = 15\text{ V}$		90		ns
Fall Time	$t_f$	$R_G = 10\text{ }\Omega$		60		ns
Total Gate Charge	$Q_G$	$I_D = 7.0\text{ A}$		33		nC
Gate to Source Charge	$Q_{GS}$	$V_{DD} = 24\text{ V}$		2.4		nC
Gate to Drain Charge	$Q_{GD}$	$V_{GS} = 10\text{ V}$		13		nC
Body Diode Forward Voltage	$V_{F(S-D)}$	$I_F = 7.0\text{ A}, V_{GS} = 0$		0.84		V
Reverse Recovery Time	$t_{rr}$	$I_F = 7.0\text{ A}, V_{GS} = 0$		60		ns
Reverse Recovery Charge	$Q_{rr}$	$di/dt = 100\text{ A}/\mu\text{s}$		90		nC

**Test Circuit 1 Switching Time****Test Circuit 2 Gate Charge**

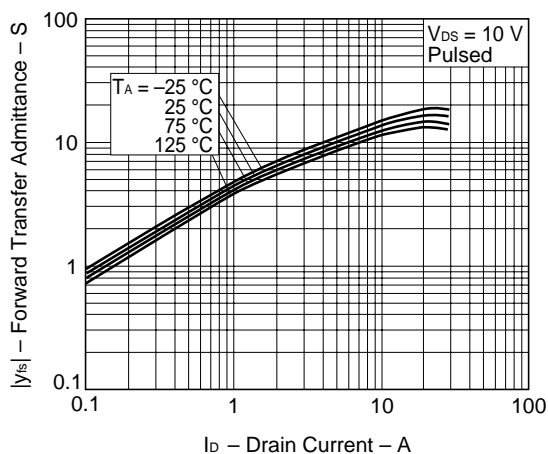
# TYPICAL CHARACTERISTICS ( $T_A = 25\text{ }^\circ\text{C}$ )



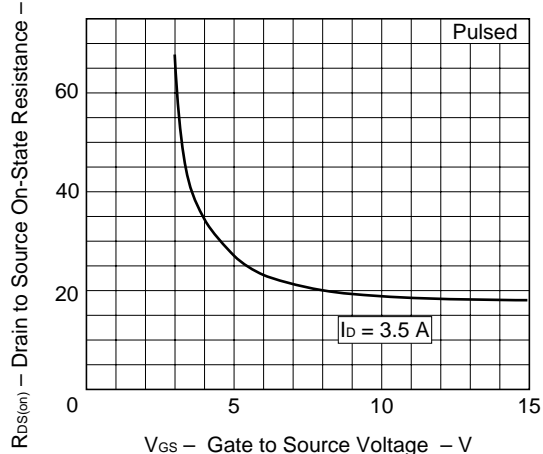
TRANSIENT THERMAL RESISTANCE vs. PULSE WIDTH



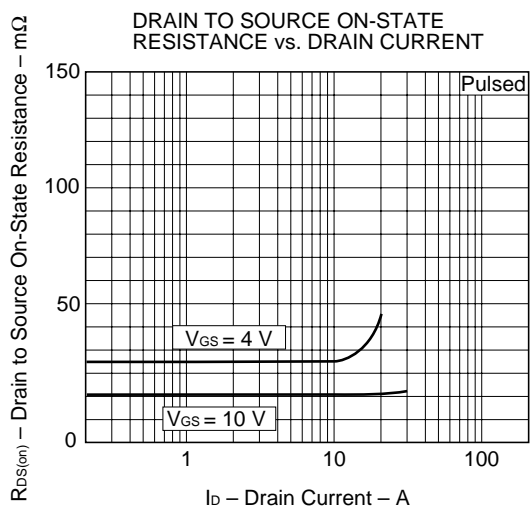
FORWARD TRANSFER ADMITTANCE vs. DRAIN CURRENT



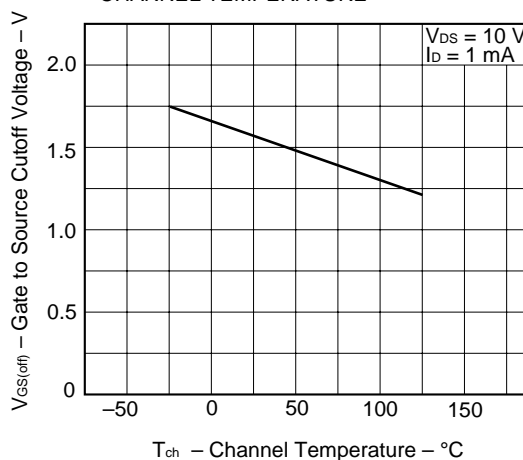
DRAIN TO SOURCE ON-STATE RESISTANCE vs. GATE TO SOURCE VOLTAGE

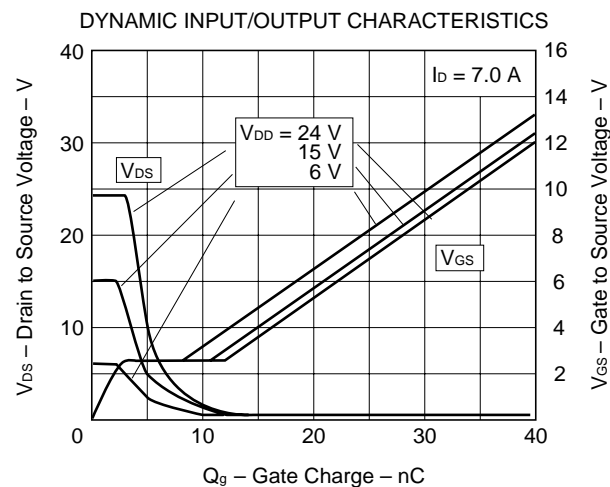
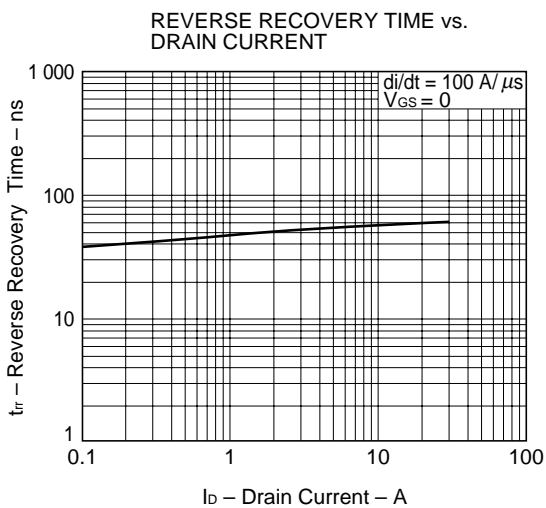
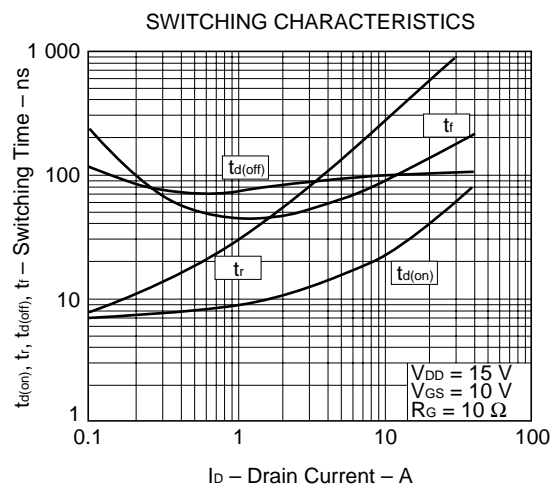
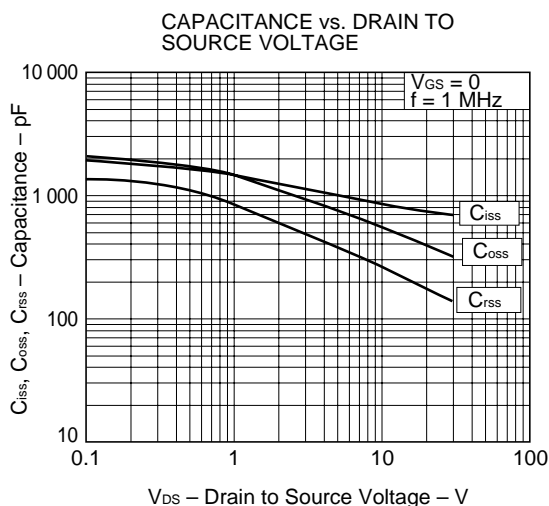
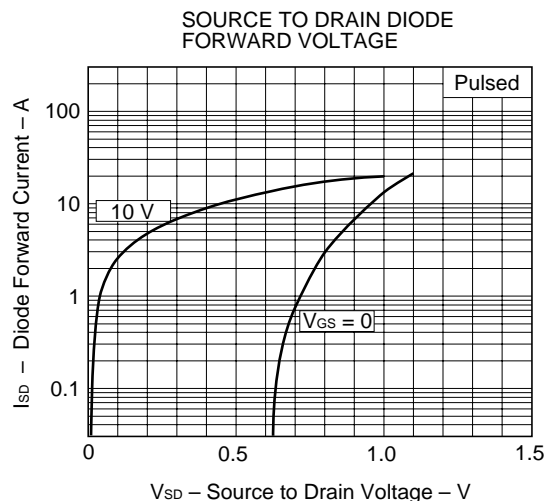
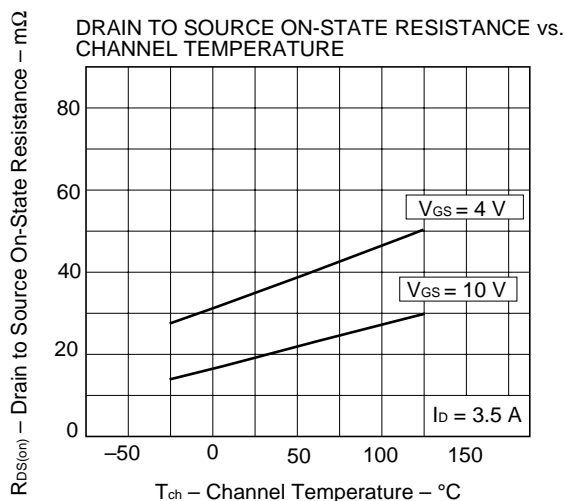


DRAIN TO SOURCE ON-STATE RESISTANCE vs. DRAIN CURRENT



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.