

SWITCHING
N- AND P-CHANNEL POWER MOS FET
INDUSTRIAL USE

DESCRIPTION

The μ PA1792 is N- and P-Channel MOS Field Effect Transistors designed for Motor Drive application of HDD and so on.

FEATURES

• Low on-resistance

N-Channel $R_{DS(on)1} = 26 \text{ m}\Omega \text{ MAX.}$ ($V_{GS} = 10 \text{ V}$, $I_D = 3.4 \text{ A}$)

$R_{DS(on)2} = 36 \text{ m}\Omega \text{ MAX.}$ ($V_{GS} = 4.5 \text{ V}$, $I_D = 3.4 \text{ A}$)

$R_{DS(on)3} = 42 \text{ m}\Omega \text{ MAX.}$ ($V_{GS} = 4.0 \text{ V}$, $I_D = 3.4 \text{ A}$)

P-Channel $R_{DS(on)1} = 36 \text{ m}\Omega \text{ MAX.}$ ($V_{GS} = -10 \text{ V}$, $I_D = -2.9 \text{ A}$)

$R_{DS(on)2} = 54 \text{ m}\Omega \text{ MAX.}$ ($V_{GS} = -4.5 \text{ V}$, $I_D = -2.9 \text{ A}$)

$R_{DS(on)3} = 65 \text{ m}\Omega \text{ MAX.}$ ($V_{GS} = -4.0 \text{ V}$, $I_D = -2.9 \text{ A}$)

• Low input capacitance

N-Channel $C_{iss} = 760 \text{ pF TYP.}$

P-Channel $C_{iss} = 900 \text{ pF TYP.}$

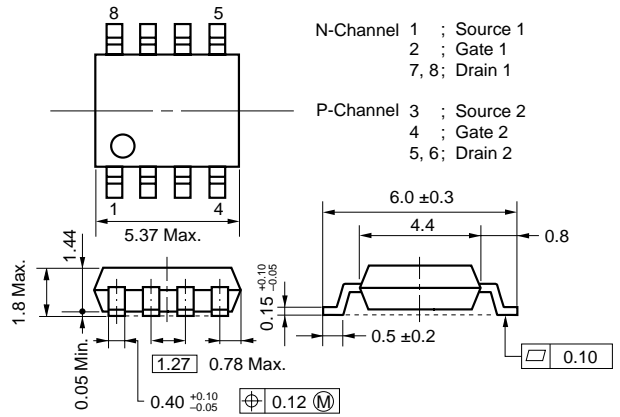
• Built-in G-S protection diode

• Small and surface mount package (Power SOP8)

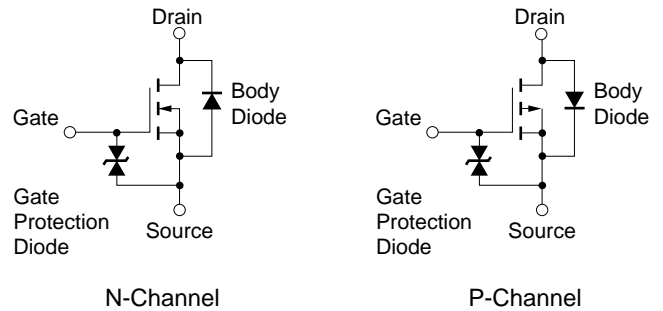
ORDERING INFORMATION

PART NUMBER	PACKAGE
μ PA1792G	Power SOP8

PACKAGE DRAWING (Unit : mm)



EQUIVALENT CIRCUIT



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

PARAMETER	SYMBOL	N-CHANNEL	P-CHANNEL	UNIT
Drain to Source Voltage (V _{GS} = 0 V)	V _{DSS}	30	-30	V
Gate to Source Voltage (V _{DS} = 0 V)	V _{GSS}	± 20	∓ 20	V
Drain Current (DC)	I _{D(DC)}	± 6.8	∓ 5.8	A
Drain Current (pulse) ^{Note1}	I _{D(pulse)}	± 27.2	∓ 23.2	A
Total Power Dissipation (1 unit) ^{Note2}	P _T	1.7		W
Total Power Dissipation (2 unit) ^{Note2}	P _T	2.0		W
Channel Temperature	T _{ch}	150		°C
Storage Temperature	T _{stg}	-55 to +150		°C

Notes 1. PW ≤ 10 μs, Duty Cycle ≤ 1%

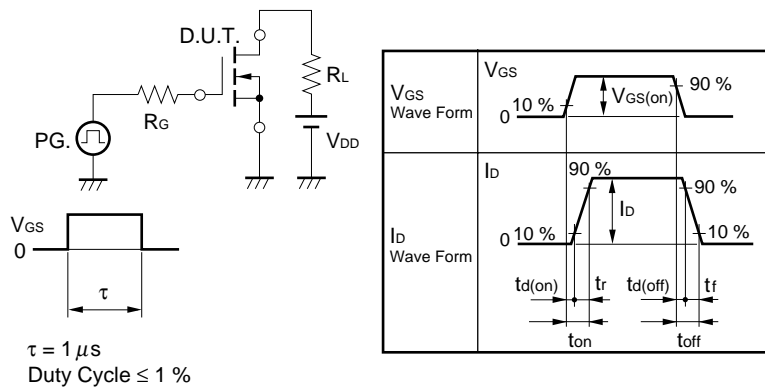
2. Mounted on ceramic substrate of 2000 mm² × 1.6 mm, T_A = 25°C

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

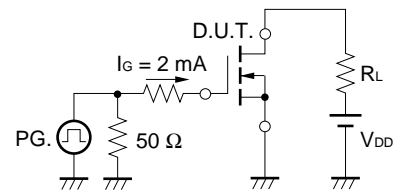
N-CHANNEL

CHARACTERISTICS	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNIT
Drain to Source On-state Resistance	R _{DS(on)1}	V _{GS} = 10 V, I _D = 3.4 A		20.5	26	mΩ
	R _{DS(on)2}	V _{GS} = 4.5 V, I _D = 3.4 A		27	36	mΩ
	R _{DS(on)3}	V _{GS} = 4.0 V, I _D = 3.4 A		31	42	mΩ
Gate to Source Cut-off Voltage	V _{GS(off)}	V _{DS} = 10 V, I _D = 1 mA	1.5	2.1	2.5	V
Forward Transfer Admittance	y _{fs}	V _{DS} = 10 V, I _D = 3.4 A	3.0	7.5		S
Drain Leakage Current	I _{DSS}	V _{DS} = 30 V, V _{GS} = 0 V			10	μA
Gate to Source Leakage Current	I _{GSS}	V _{GS} = ±16 V, V _{DS} = 0 V			±10	μA
Input Capacitance	C _{iss}	V _{DS} = 10 V		760		pF
Output Capacitance	C _{oss}	V _{GS} = 0 V		250		pF
Reverse Transfer Capacitance	C _{rss}	f = 1 MHz		95		pF
Turn-on Delay Time	t _{d(on)}	I _D = 3.4 A		20		ns
Rise Time	t _r	V _{GS(on)} = 10 V		140		ns
Turn-off Delay Time	t _{d(off)}	V _{DD} = 15 V		50		ns
Fall Time	t _f	R _G = 10 Ω		30		ns
Total Gate Charge	Q _G	I _D = 6.8 A		14		nC
Gate to Source Charge	Q _{GS}	V _{DD} = 24 V		2		nC
Gate to Drain Charge	Q _{GD}	V _{GS} = 10 V		5		nC
Body Diode Forward Voltage	V _{F(S-D)}	I _F = 6.8 A, V _{GS} = 0 V		0.86		V
Reverse Recovery Time	t _{rr}	I _F = 6.8 A, V _{GS} = 0 V		30		ns
Reverse Recovery Charge	Q _{rr}	di/dt = 100 A / μs		20		nC

TEST CIRCUIT 1 SWITCHING TIME



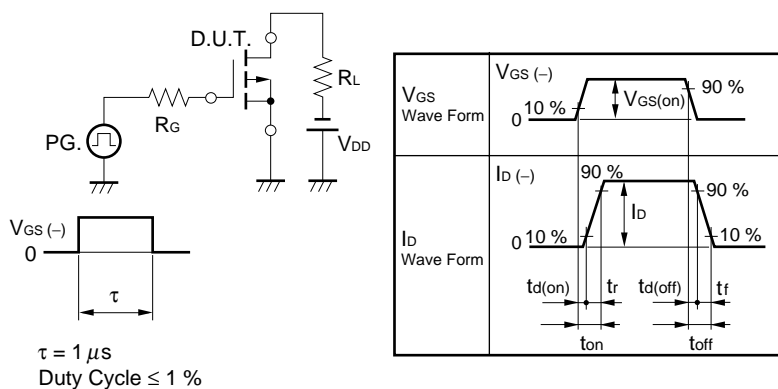
TEST CIRCUIT 2 GATE CHARGE



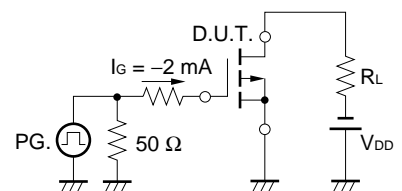
P-CHANNEL

CHARACTERISTICS	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNIT
Drain to Source On-state Resistance	$R_{DS(on)1}$	$V_{GS} = -10\text{ V}, I_D = -2.9\text{ A}$		30	36	mΩ
	$R_{DS(on)2}$	$V_{GS} = -4.5\text{ V}, I_D = -2.9\text{ A}$		43	54	mΩ
	$R_{DS(on)3}$	$V_{GS} = -4.0\text{ V}, I_D = -2.9\text{ A}$		49	65	mΩ
Gate to Source Cut-off Voltage	$V_{GS(off)}$	$V_{DS} = -10\text{ V}, I_D = -1\text{ mA}$	-1.5	-2.0	-2.5	V
Forward Transfer Admittance	$ y_{fs} $	$V_{DS} = -10\text{ V}, I_D = -2.9\text{ A}$	3.5	8.0		S
Drain Leakage Current	I_{DSS}	$V_{DS} = -30\text{ V}, V_{GS} = 0\text{ V}$			-1	μA
Gate to Source Leakage Current	I_{GSS}	$V_{GS} = \mp 16\text{ V}, V_{DS} = 0\text{ V}$			∓ 10	μA
Input Capacitance	C_{iss}	$V_{DS} = -10\text{ V}$		900		pF
Output Capacitance	C_{oss}	$V_{GS} = 0\text{ V}$		300		pF
Reverse Transfer Capacitance	C_{riss}	$f = 1\text{ MHz}$		120		pF
Turn-on Delay Time	$t_{d(on)}$	$I_D = -2.9\text{ A}$		23		ns
Rise Time	t_r	$V_{GS(on)} = -10\text{ V}$		220		ns
Turn-off Delay Time	$t_{d(off)}$	$V_{DD} = -15\text{ V}$		90		ns
Fall Time	t_f	$R_G = 10\ \Omega$		70		ns
Total Gate Charge	Q_G	$I_D = -5.8\text{ A}$		17		nC
Gate to Source Charge	Q_{GS}	$V_{DD} = -24\text{ V}$		2.5		nC
Gate to Drain Charge	Q_{GD}	$V_{GS} = -10\text{ V}$		4.0		nC
Body Diode Forward Voltage	$V_{F(S-D)}$	$I_F = 5.8\text{ A}, V_{GS} = 0\text{ V}$		0.85		V
Reverse Recovery Time	t_{rr}	$I_F = 5.8\text{ A}, V_{GS} = 0\text{ V}$		40		ns
Reverse Recovery Charge	Q_{rr}	$di/dt = 100\text{ A}/\mu\text{s}$		30		nC

TEST CIRCUIT 1 SWITCHING TIME



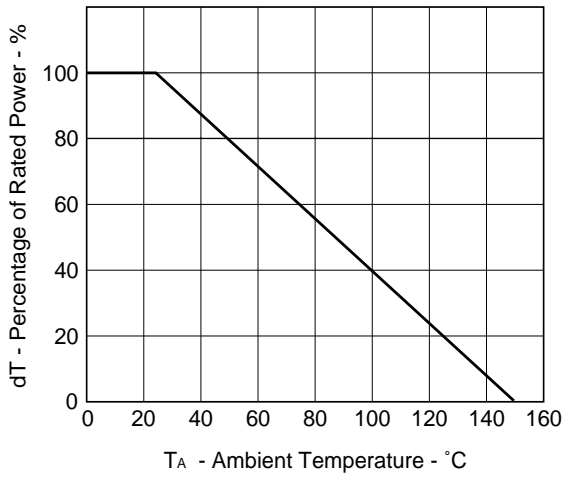
TEST CIRCUIT 2 GATE CHARGE



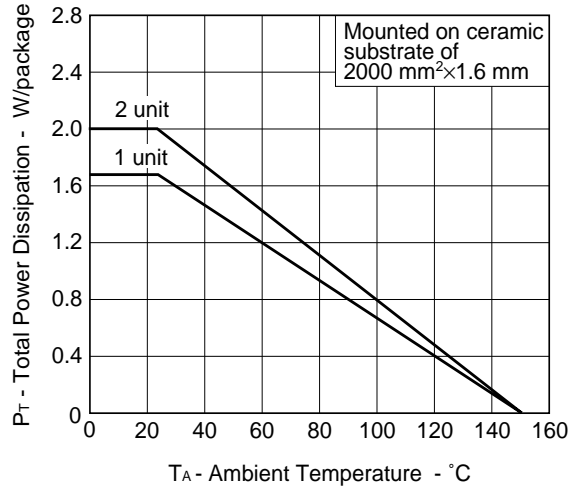
TYPICAL CHARACTERISTICS (T_A = 25°C)

A) N-Channel

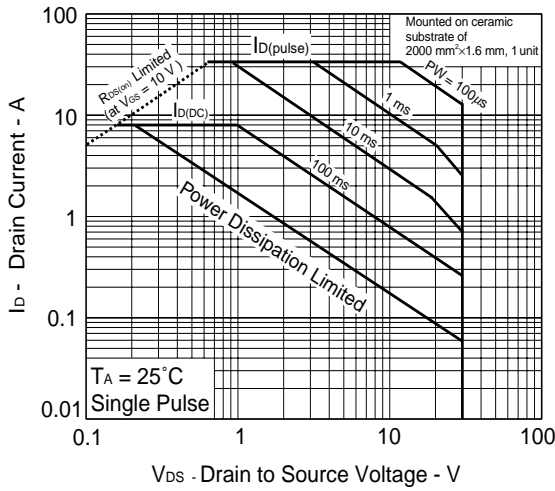
DERATING FACTOR OF FORWARD BIAS SAFE OPERATING AREA



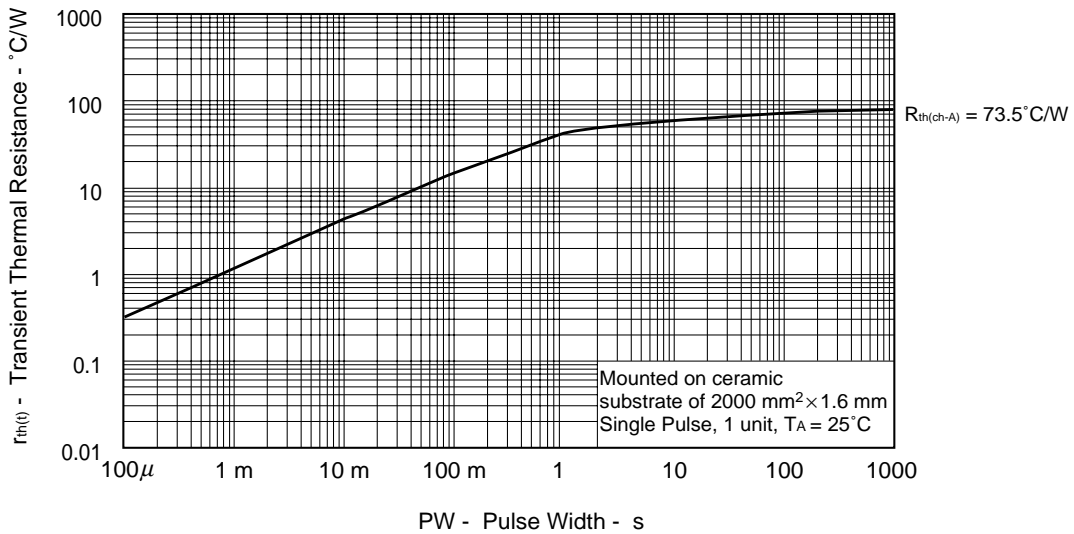
TOTAL POWER DISSIPATION vs. AMBIENT TEMPERATURE



★ FORWARD BIAS SAFE OPERATING AREA

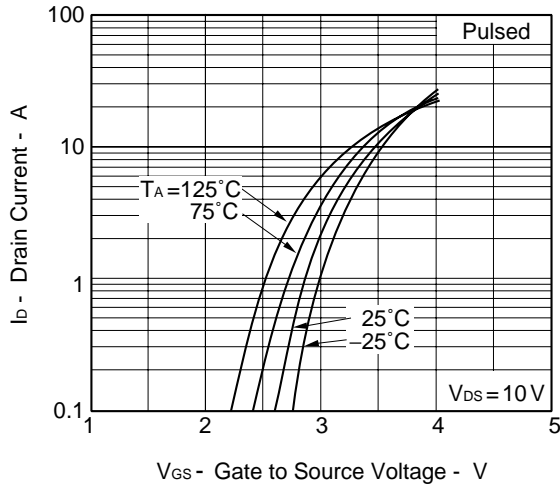


TRANSIENT THERMAL RESISTANCE vs. PULSE WIDTH

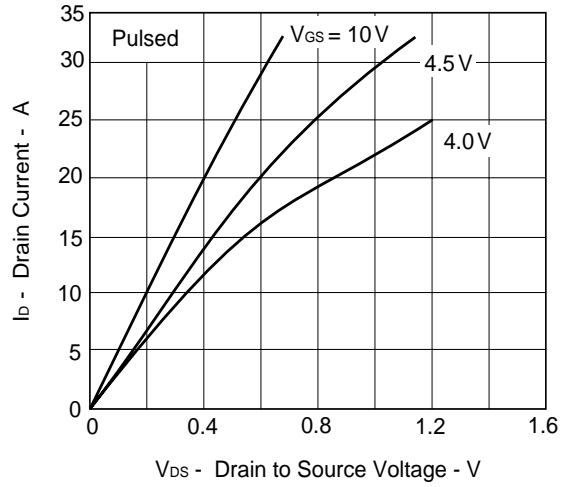


A) N-Channel

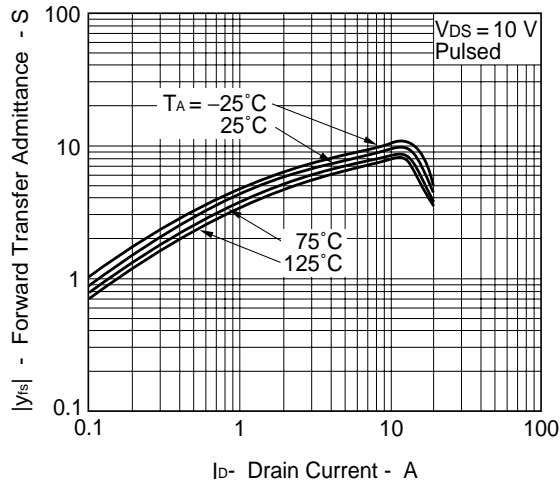
FORWARD TRANSFER CHARACTERISTICS



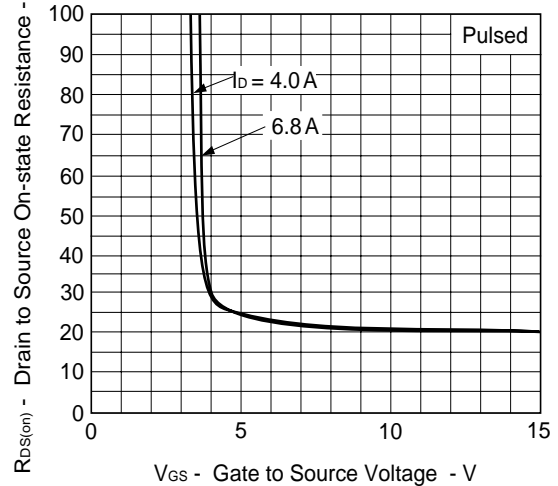
DRAIN CURRENT vs. DRAIN TO SOURCE VOLTAGE



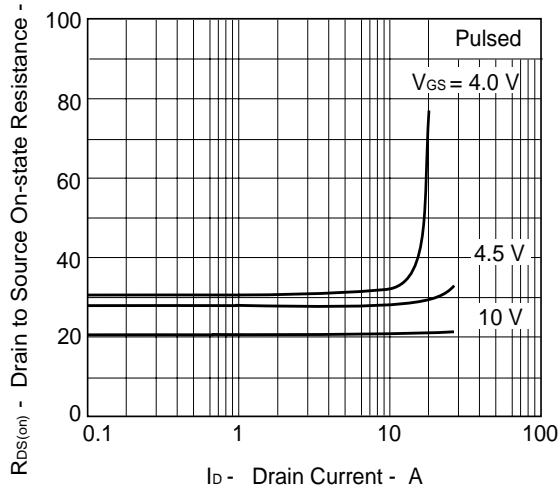
FORWARD TRANSFER ADMITTANCE vs. DRAIN CURRENT



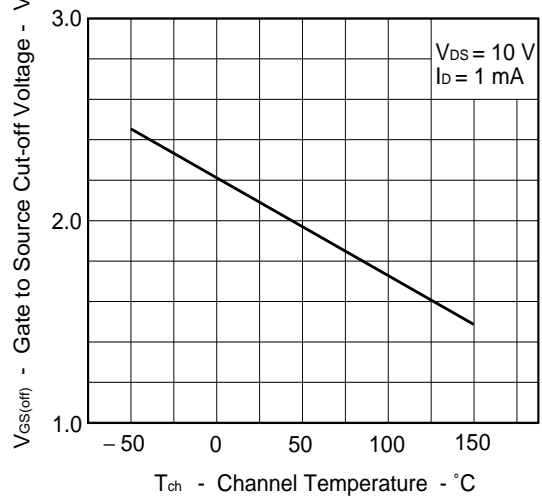
DRAIN TO SOURCE ON-STATE RESISTANCE vs. GATE TO SOURCE VOLTAGE



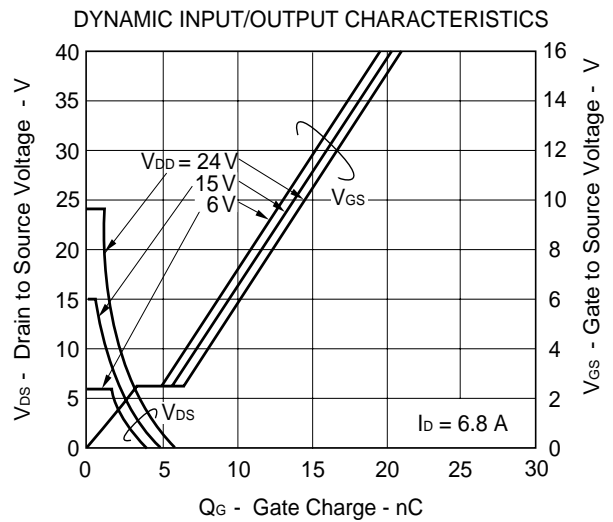
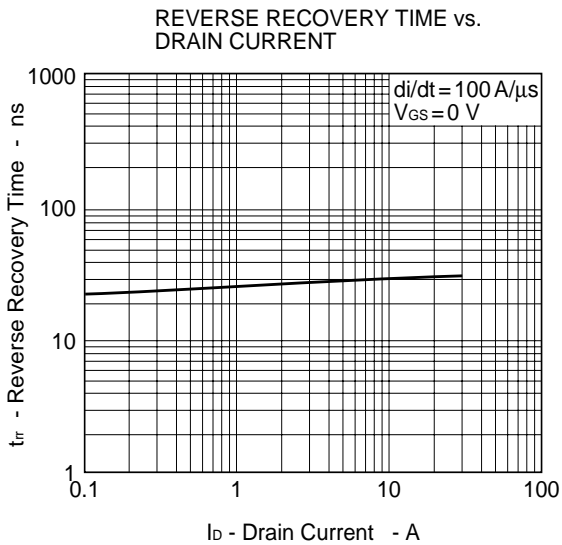
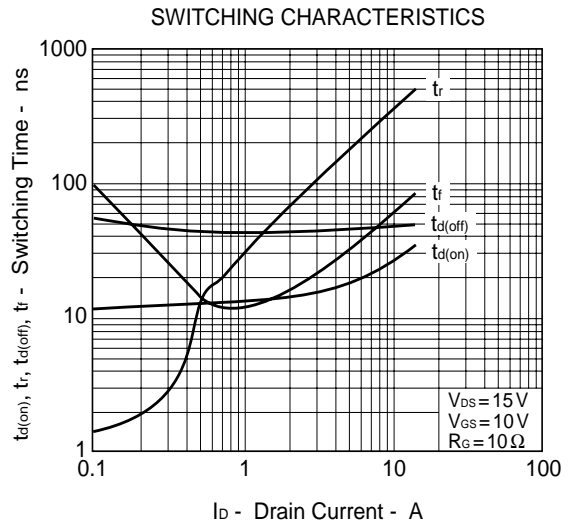
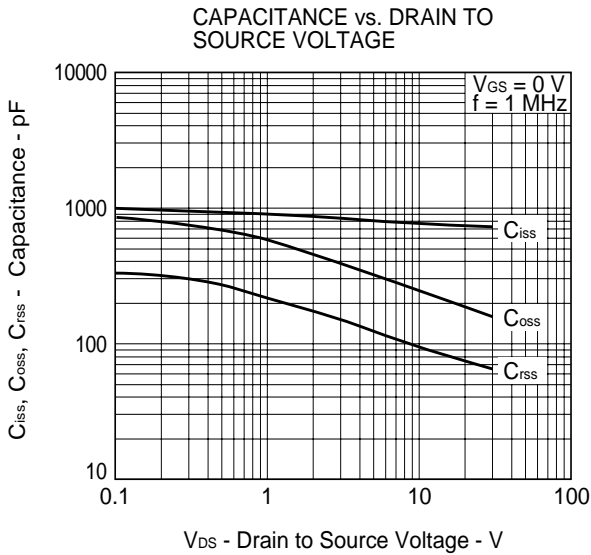
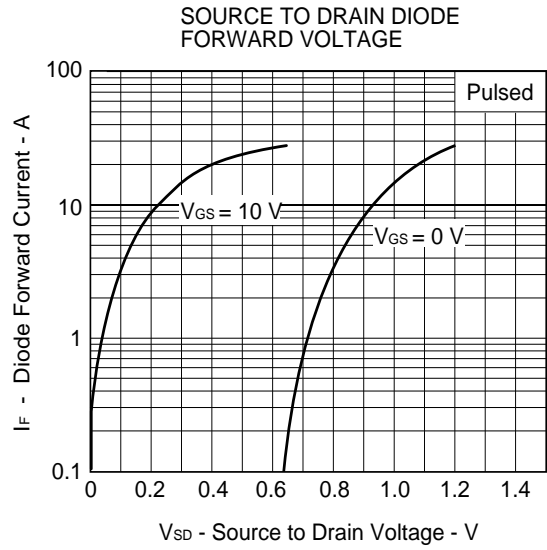
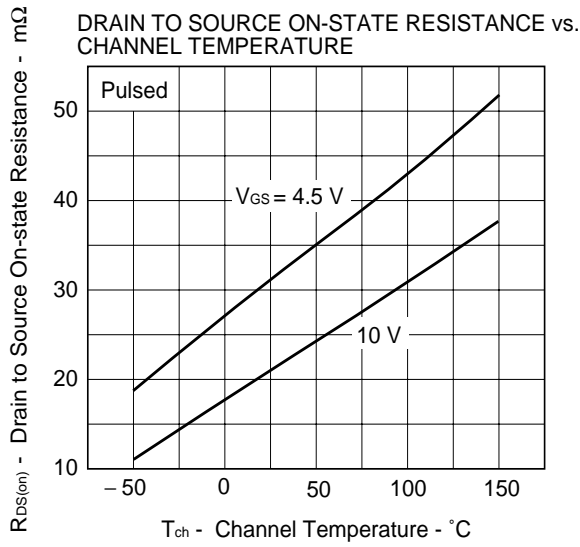
DRAIN TO SOURCE ON-STATE RESISTANCE vs. DRAIN CURRENT



GATE TO SOURCE CUT-OFF VOLTAGE vs. CHANNEL TEMPERATURE

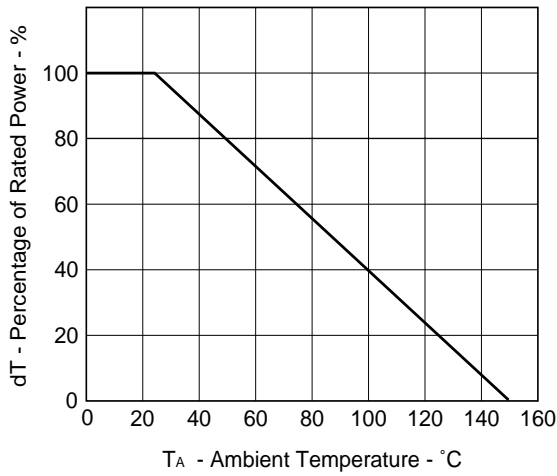


A) N-Channel

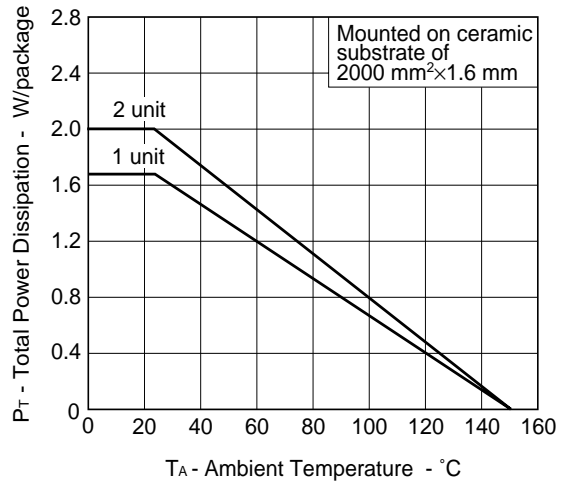


B) P-Channel

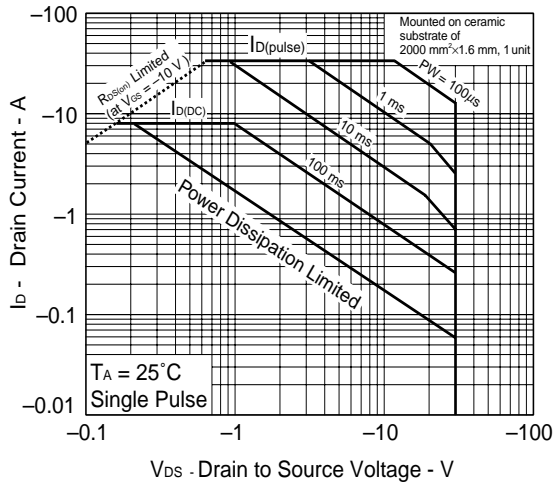
DERATING FACTOR OF FORWARD BIAS SAFE OPERATING AREA



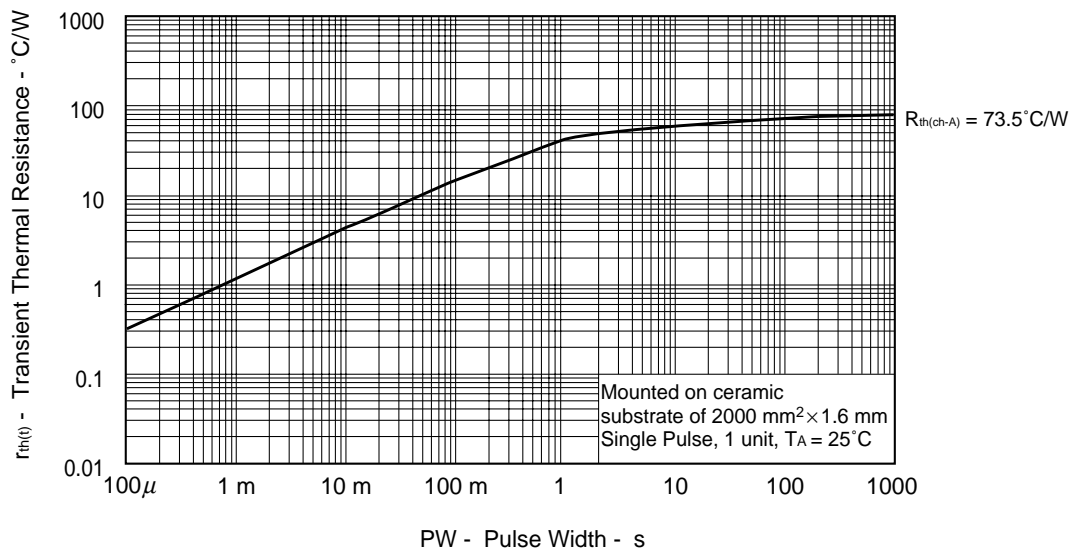
TOTAL POWER DISSIPATION vs. AMBIENT TEMPERATURE



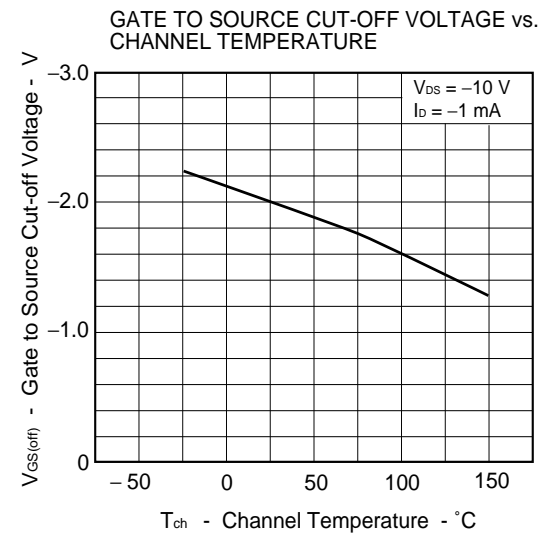
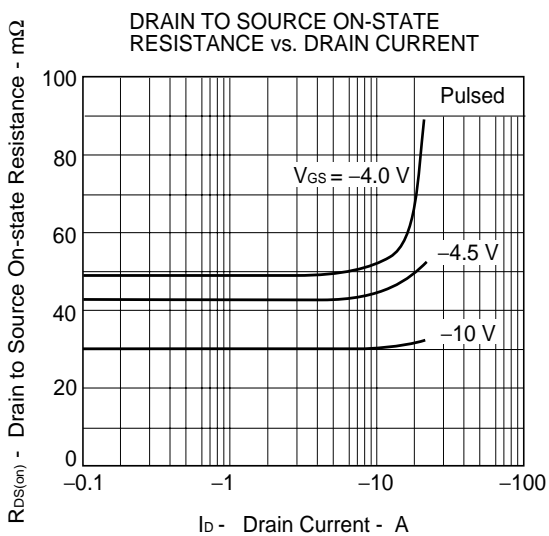
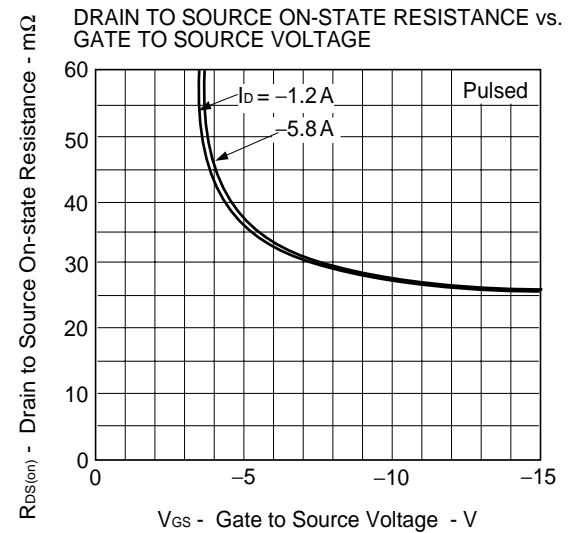
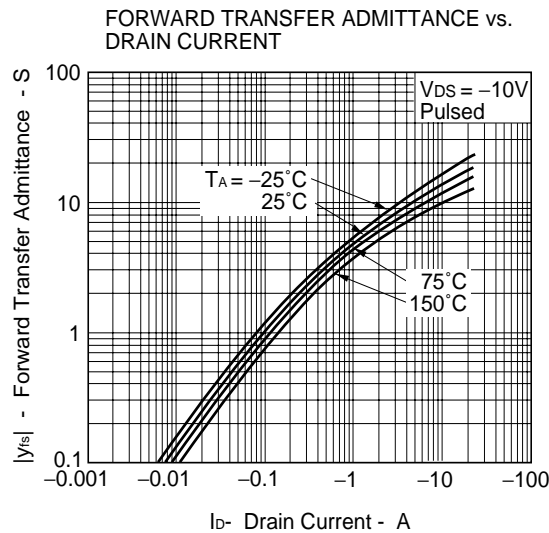
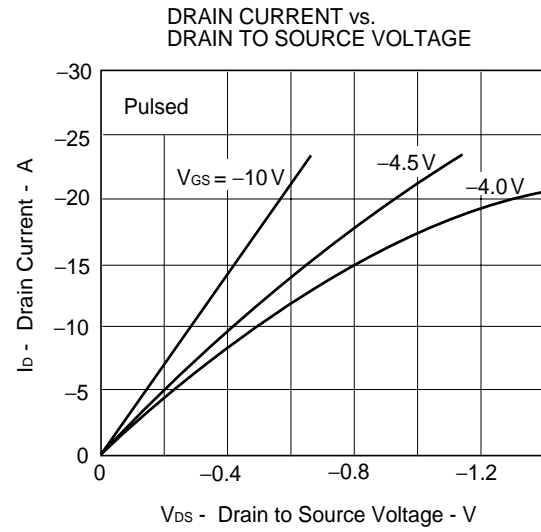
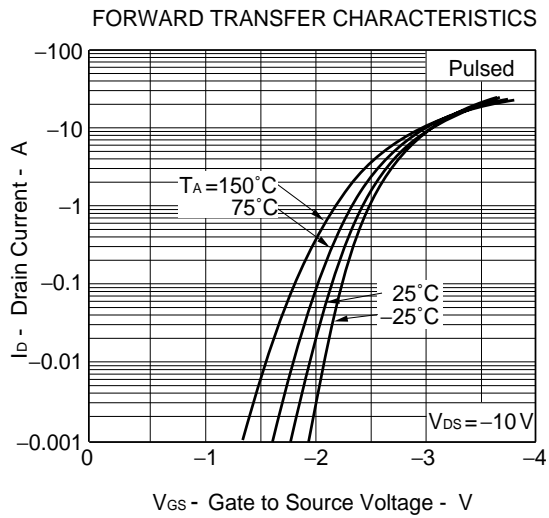
★ FORWARD BIAS SAFE OPERATING AREA



TRANSIENT THERMAL RESISTANCE vs. PULSE WIDTH

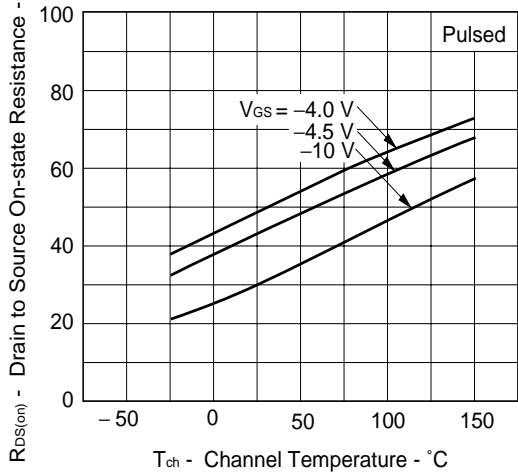


B) P-Channel

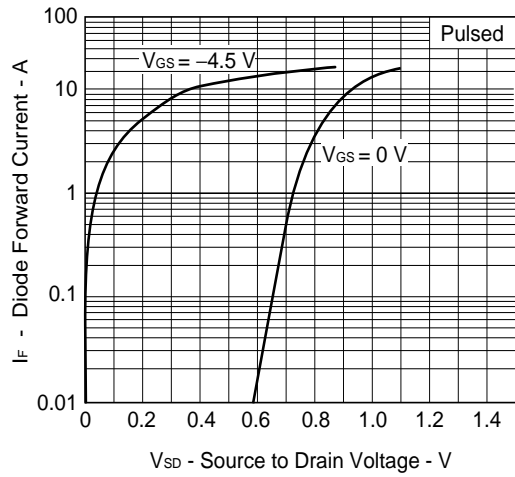


B) P-Channel

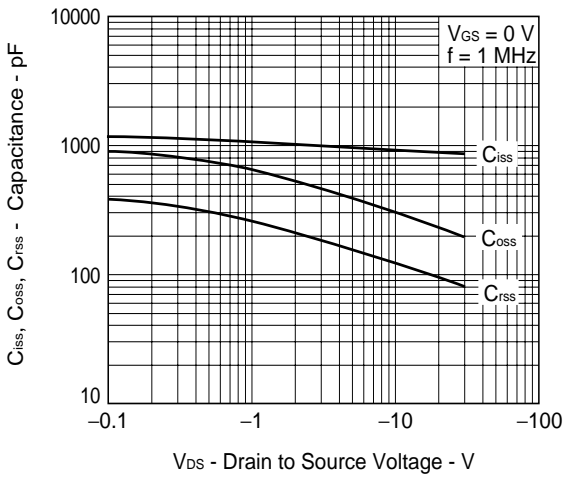
DRAIN TO SOURCE ON-STATE RESISTANCE vs. CHANNEL TEMPERATURE



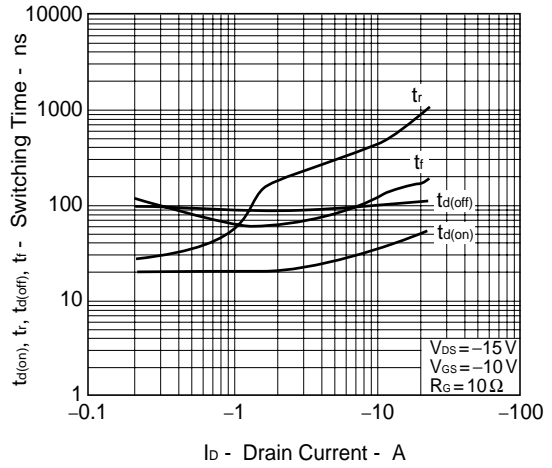
SOURCE TO DRAIN DIODE FORWARD VOLTAGE



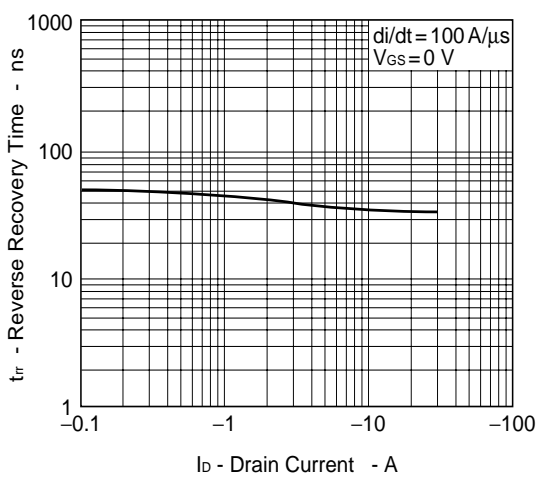
CAPACITANCE vs. DRAIN TO SOURCE VOLTAGE



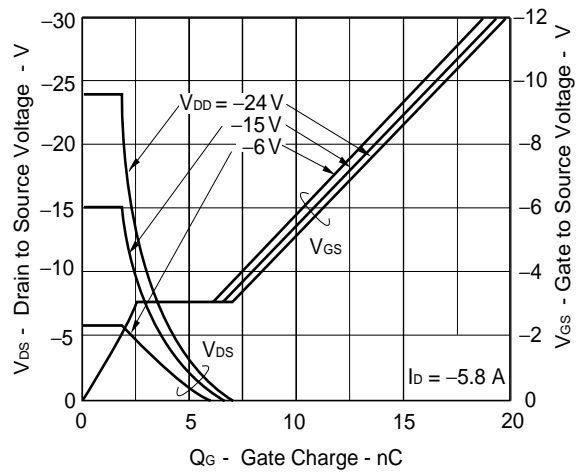
SWITCHING CHARACTERISTICS



REVERSE RECOVERY TIME vs. DRAIN CURRENT



DYNAMIC INPUT/OUTPUT CHARACTERISTICS



[MEMO]

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