

SWITCHING
N-CHANNEL POWER MOS FET

DESCRIPTION

The μPA2751GR is asymmetrical dual N-Channel MOS Field Effect Transistor designed for DC/DC converters of notebook computers and so on.

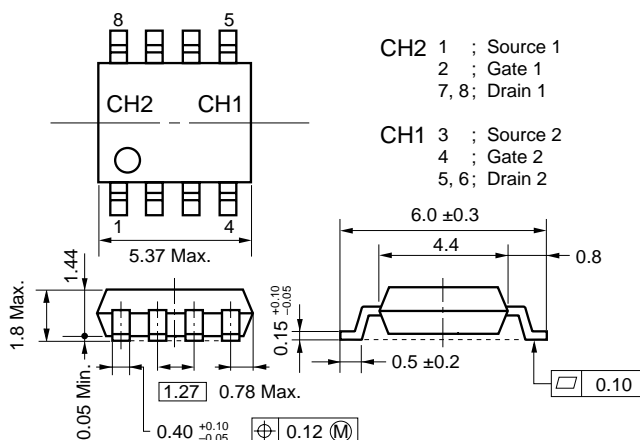
FEATURES

- Asymmetric dual chip type
- Low on-state resistance, Low C_{iss}
CH1: R_{DS(on)2}: 21.0 mΩ MAX. (V_{GS} = 4.5 V, I_D = 4.5 A)
C_{iss} = 1040 pF TYP. (V_{DS} = 10 V, V_{GS} = 0 V)
CH2: R_{DS(on)2}: 35.0 mΩ MAX. (V_{GS} = 4.5 V, I_D = 4.0 A)
C_{iss} = 480 pF TYP. (V_{DS} = 10 V, V_{GS} = 0 V)
- Built-in G-S protection diode
- Small and surface mount package (Power SOP8)

ORDERING INFORMATION

PART NUMBER	PACKAGE
μPA2751GR	Power SOP8

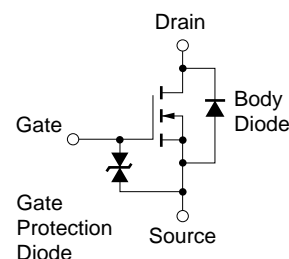
PACKAGE DRAWING (Unit: mm)



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

Drain to Source Voltage (V _{GS} = 0 V)	CH1/CH2	V _{DS}	30	V
Gate to Source Voltage (V _{DS} = 0 V)	CH1/CH2	V _{GS}	±20	V
Drain Current (DC)	CH1	I _{D(DC)}	±9.0	A
	CH2	I _{D(DC)}	±8.0	A
Drain Current (pulse) ^{Note1}	CH1	I _{D(pulse)}	±36	A
	CH2	I _{D(pulse)}	±32	A
Total Power Dissipation (1 unit) ^{Note2}	CH1/CH2	P _T	1.7	W
Total Power Dissipation (2 unit) ^{Note2}	CH1/CH2	P _T	2.0	W
Channel Temperature	CH1/CH2	T _{ch}	150	°C
Storage Temperature	CH1/CH2	T _{stg}	-55 to + 150	°C
Single Avalanche Current ^{Note3}	CH1	I _{AS}	9.0	A
Single Avalanche Energy ^{Note3}	CH1	E _{AS}	8.1	mJ
Single Avalanche Current ^{Note3}	CH2	I _{AS}	8.0	A
Single Avalanche Energy ^{Note3}	CH2	E _{AS}	6.4	mJ

EQUIVALENT CIRCUIT (1/2 circuit)



- Notes 1.** PW ≤ 10 μs, Duty cycle ≤ 1%
2. T_A = 25°C, Mounted on ceramic substrate of 2000 mm² x 1.6 mm
3. Starting T_{ch} = 25°C, V_{DD} = 15 V, R_G = 25 Ω, V_{GS} = 20 → 0 V

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.

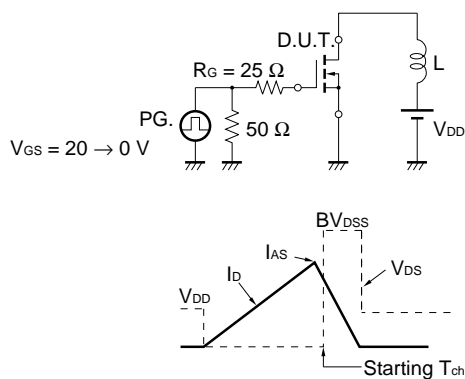
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ELECTRICAL CHARACTERISTICS (T_A = 25°C, All terminals are connected.)

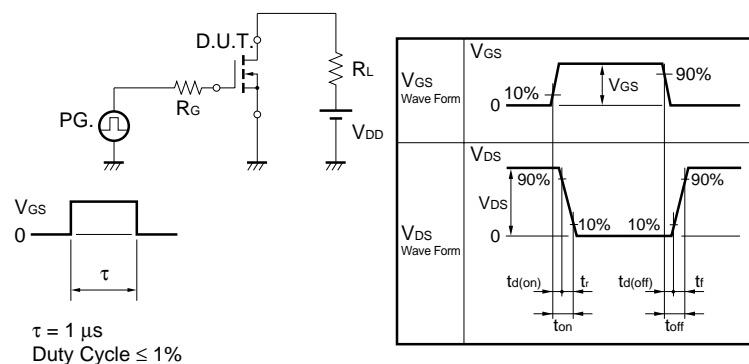
CH1

CHARACTERISTICS	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNIT
Zero Gate Voltage Drain Current	I _{DSS}	V _{DS} = 30 V, V _{GS} = 0 V			10	μA
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	1.5	2.0	2.5	V
Forward Transfer Admittance	y _{fs}	V _{DS} = 10 V, I _D = 4.5 A	5	11		S
Drain to Source On-state Resistance	R _{DS(on)1}	V _{GS} = 10 V, I _D = 4.5 A		12.5	15.5	mΩ
	R _{DS(on)2}	V _{GS} = 4.5 V, I _D = 4.5 A		16.0	21.0	mΩ
	R _{DS(on)3}	V _{GS} = 4.0 V, I _D = 4.5 A		17.9	23.9	mΩ
Input Capacitance	C _{iss}	V _{DS} = 10 V		1040		pF
Output Capacitance	C _{oss}	V _{GS} = 0 V		390		pF
Reverse Transfer Capacitance	C _{rss}	f = 1 MHz		130		pF
Turn-on Delay Time	t _{d(on)}	V _{DD} = 15 V, I _D = 4.5 A		13		ns
Rise Time	t _r	V _{GS} = 10 V		10		ns
Turn-off Delay Time	t _{d(off)}	R _G = 10 Ω		43		ns
Fall Time	t _f			9		ns
Total Gate Charge	Q _G	V _{DD} = 24 V		21		nC
Gate to Source Charge	Q _{GS}	V _{GS} = 10 V		3.3		nC
Gate to Drain Charge	Q _{GD}	I _D = 9.0 A		5.1		nC
Body Diode Forward Voltage	V _{F(S-D)}	I _F = 9.0 A, V _{GS} = 0 V		0.84		V
Reverse Recovery Time	t _{rr}	I _F = 9.0 A, V _{GS} = 0 V		34		ns
Reverse Recovery Charge	Q _{rr}	di/dt = 100 A/μs		34		nC

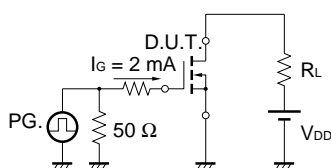
TEST CIRCUIT 1 AVALANCHE CAPABILITY



TEST CIRCUIT 2 SWITCHING TIME



TEST CIRCUIT 3 GATE CHARGE

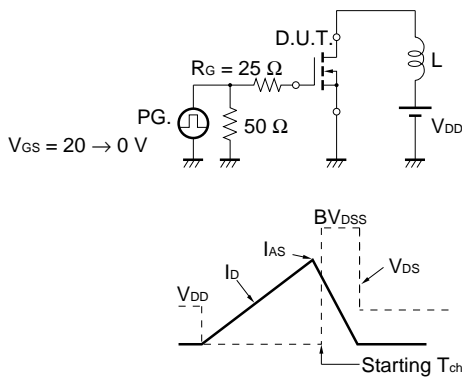


ELECTRICAL CHARACTERISTICS (T_A = 25°C, All terminals are connected.)

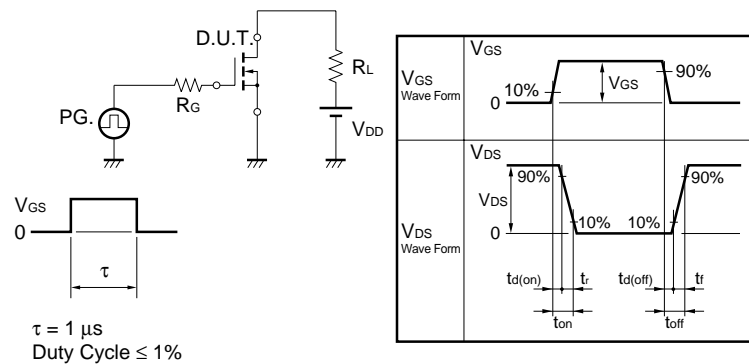
CH2

CHARACTERISTICS	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNIT
Zero Gate Voltage Drain Current	I _{DSS}	V _{DS} = 30 V, V _{GS} = 0 V			10	μA
Gate Leakage Current	I _{GSS}	V _{GS} = ±18 V, V _{DS} = 0 V			±10	μA
Gate Cut-off Voltage	V _{GS(off)}	V _{DS} = 10 V, I _D = 1 mA	1.5	2.0	2.5	V
Forward Transfer Admittance	y _{fs}	V _{DS} = 10 V, I _D = 4.0 A	3.5	7		S
Drain to Source On-state Resistance	R _{DS(on)1}	V _{GS} = 10 V, I _D = 4.0 A		18.0	23.0	mΩ
	R _{DS(on)2}	V _{GS} = 4.5 V, I _D = 4.0 A		25.0	35.0	mΩ
	R _{DS(on)3}	V _{GS} = 4.0 V, I _D = 4.0 A		28.5	41.0	mΩ
Input Capacitance	C _{iss}	V _{DS} = 10 V		480		pF
Output Capacitance	C _{oss}	V _{GS} = 0 V		190		pF
Reverse Transfer Capacitance	C _{rss}	f = 1 MHz		70		pF
Turn-on Delay Time	t _{d(on)}	V _{DD} = 15 V, I _D = 4.0 A		9.9		ns
Rise Time	t _r	V _{GS} = 10 V		6.2		ns
Turn-off Delay Time	t _{d(off)}	R _G = 10 Ω		25		ns
Fall Time	t _f			5.8		ns
Total Gate Charge	Q _G	V _{DD} = 24 V		10		nC
Gate to Source Charge	Q _{GS}	V _{GS} = 10 V		1.9		nC
Gate to Drain Charge	Q _{GD}	I _D = 8.0 A		2.6		nC
Body Diode Forward Voltage	V _{F(S-D)}	I _F = 8.0 A, V _{GS} = 0 V		0.81		V
Reverse Recovery Time	t _{rr}	I _F = 8.0 A, V _{GS} = 0 V		28		ns
Reverse Recovery Charge	Q _{rr}	di/dt = 100 A/μs		23		nC

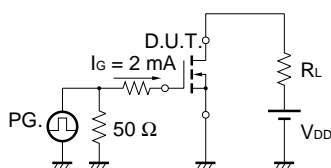
TEST CIRCUIT 1 AVALANCHE CAPABILITY



TEST CIRCUIT 2 SWITCHING TIME



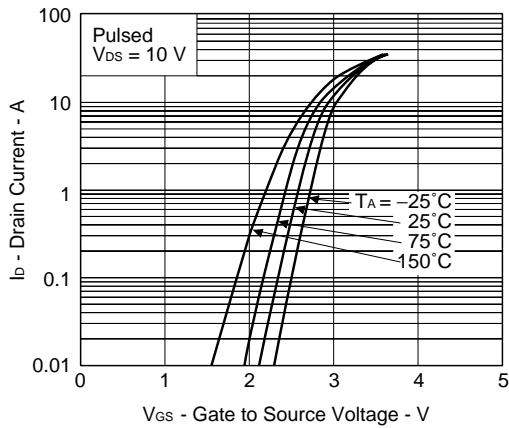
TEST CIRCUIT 3 GATE CHARGE



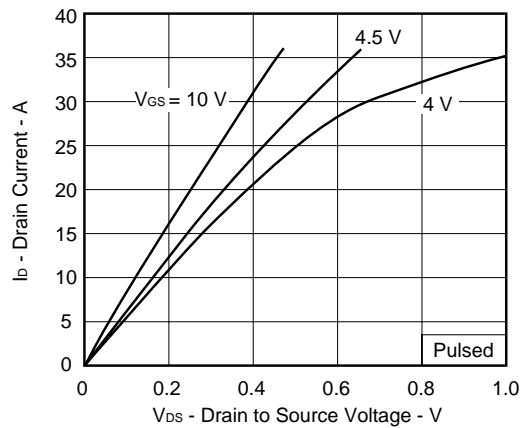
TYPICAL CHARACTERISTICS (T_A = 25°C)

A) CH1

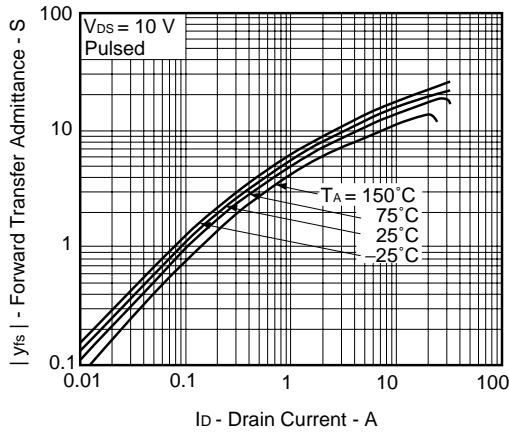
FORWARD TRANSFER CHARACTERISTICS



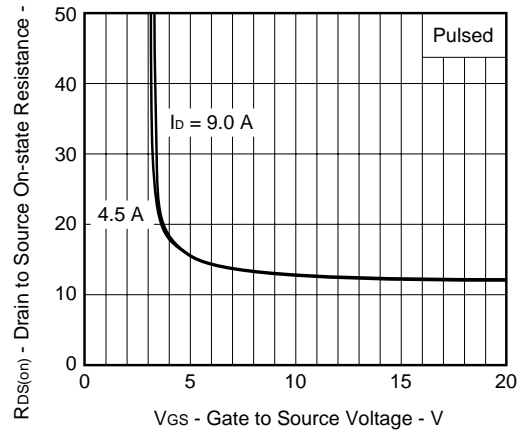
DRAIN CURRENT vs. DRAIN TO SOURCE VOLTAGE



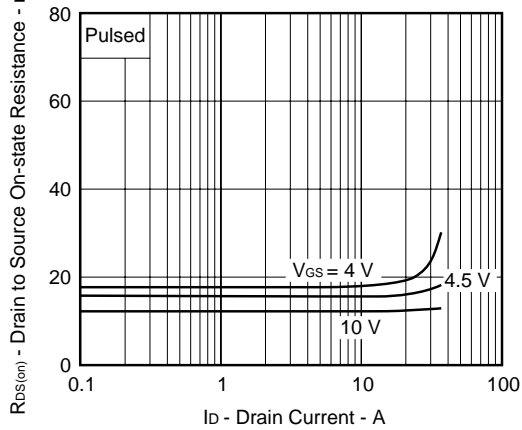
FORWARD TRANSFER ADMITTANCE vs. DRAIN CURRENT



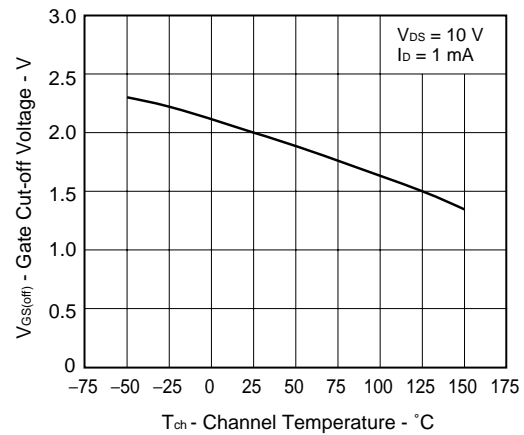
DRAIN TO SOURCE ON-STATE RESISTANCE vs. GATE TO SOURCE VOLTAGE



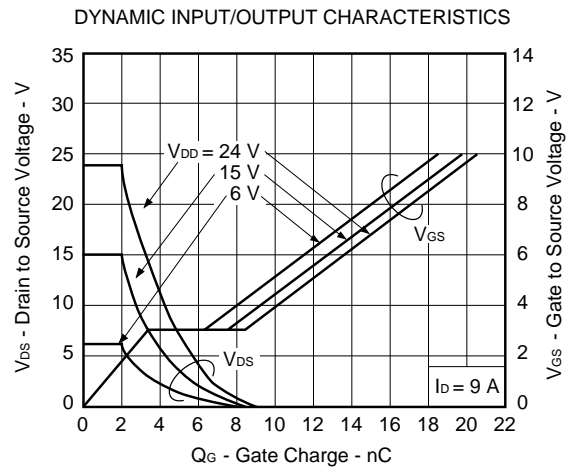
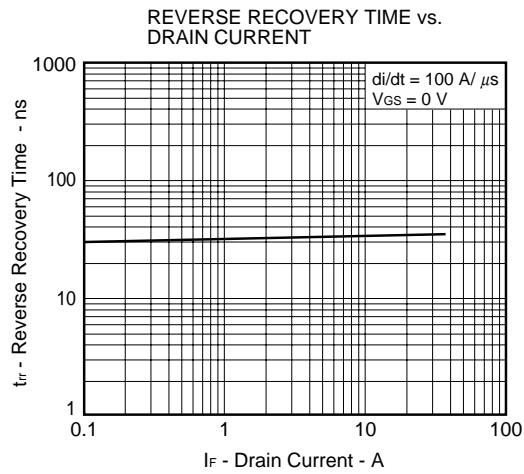
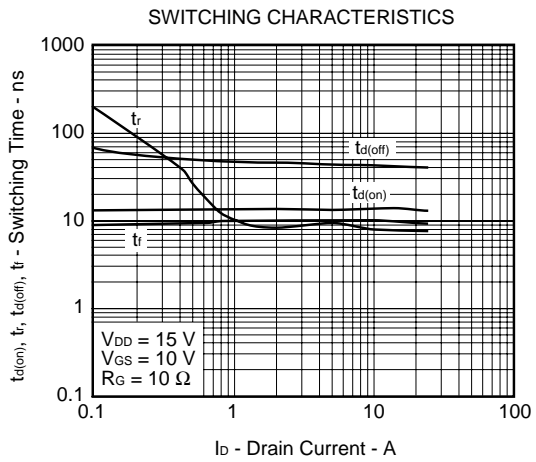
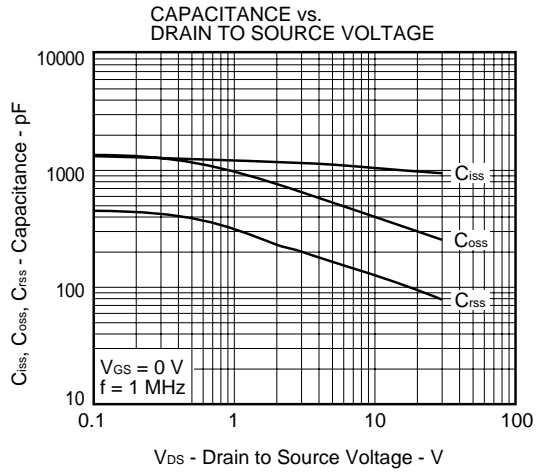
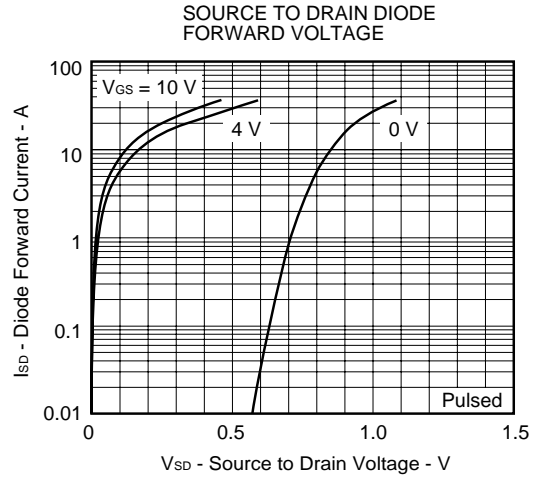
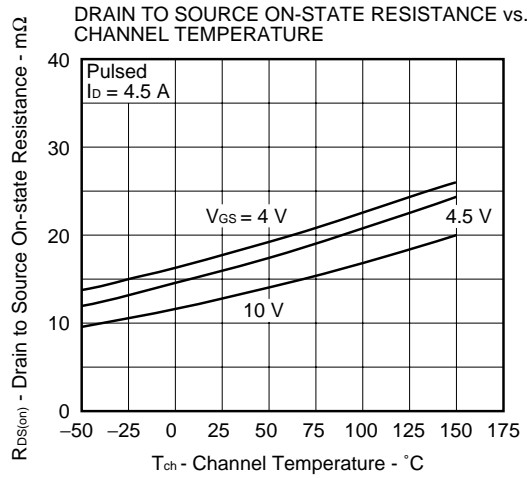
DRAIN TO SOURCE ON-STATE RESISTANCE vs. DRAIN CURRENT



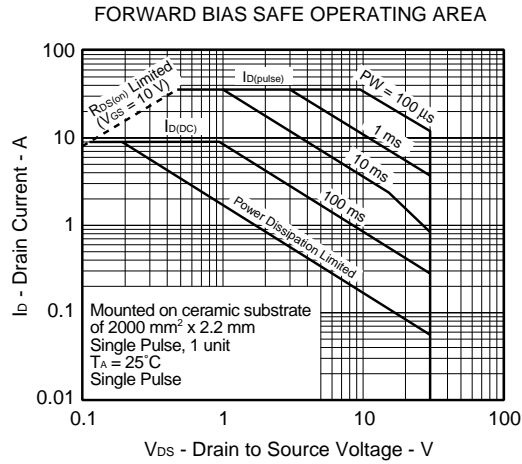
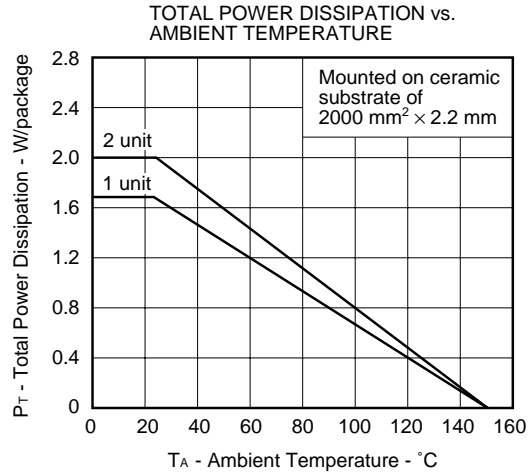
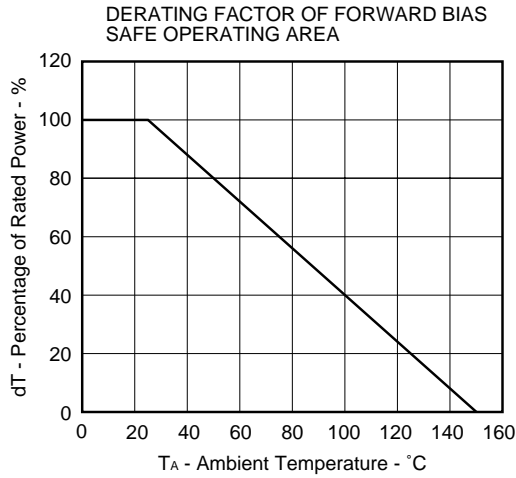
GATE CUT-OFF VOLTAGE vs. CHANNEL TEMPERATURE



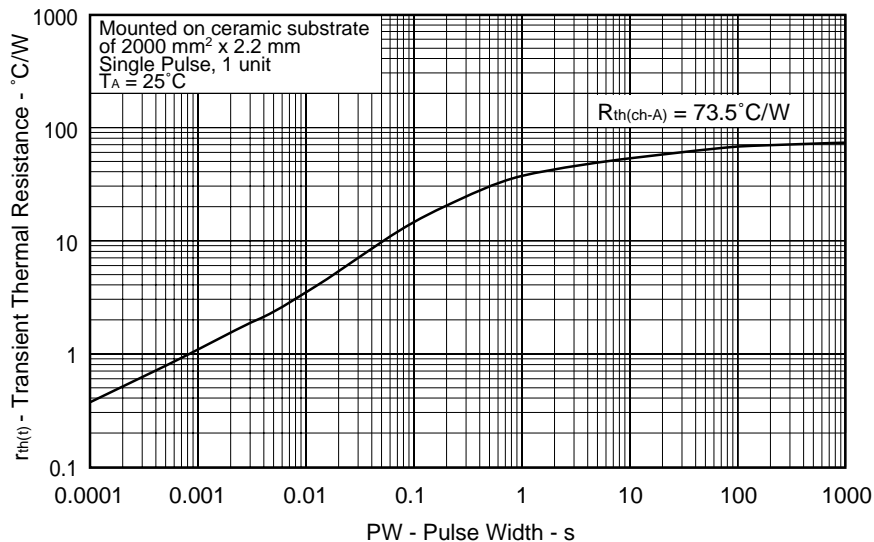
A) CH1



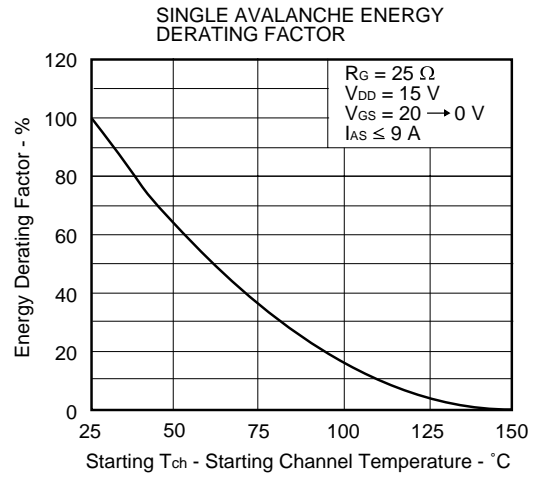
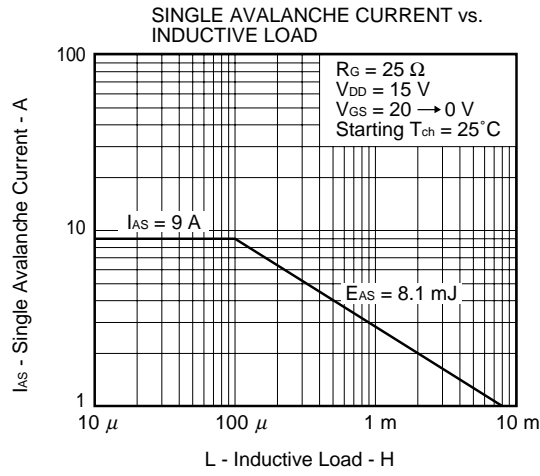
A) CH1



TRANSIENT THERMAL RESISTANCE vs. PULSE WIDTH



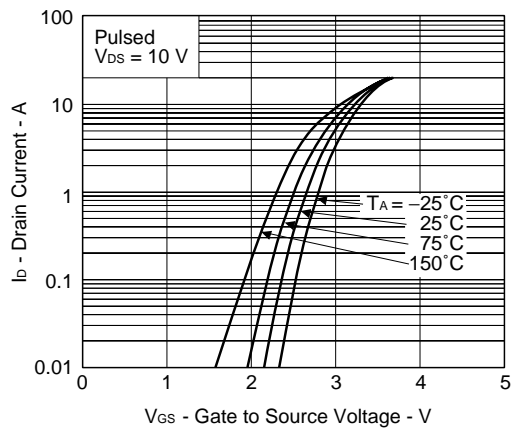
A) CH1



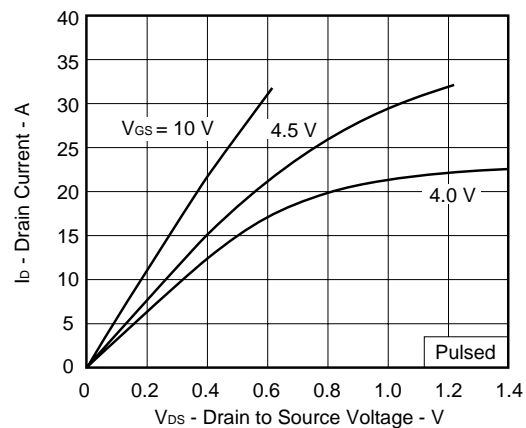
TYPICAL CHARACTERISTICS (TA = 25°C)

B) CH2

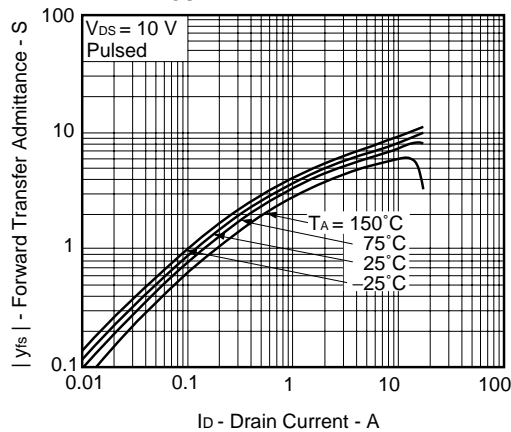
FORWARD TRANSFER CHARACTERISTICS



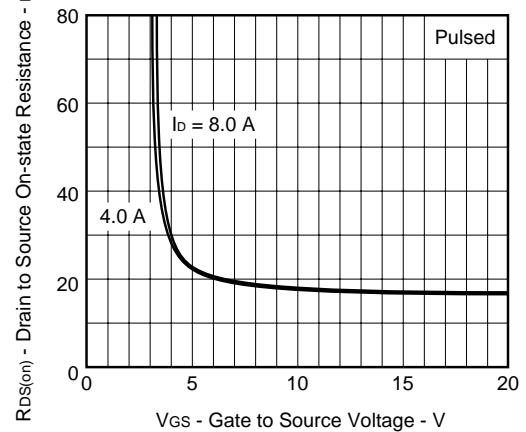
DRAIN CURRENT vs. DRAIN TO SOURCE VOLTAGE



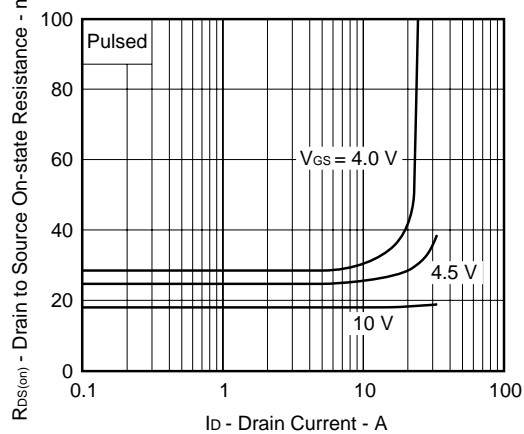
FORWARD TRANSFER ADMITTANCE vs. DRAIN CURRENT



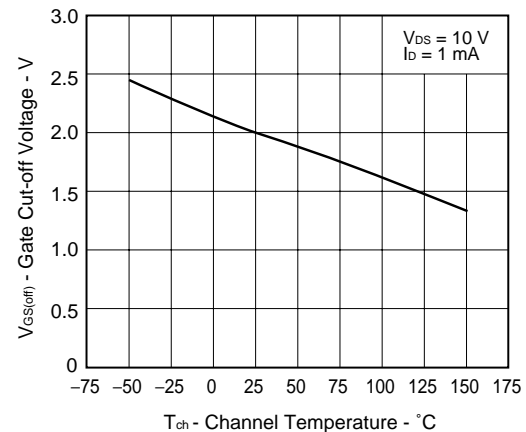
DRAIN TO SOURCE ON-STATE RESISTANCE vs. GATE TO SOURCE VOLTAGE



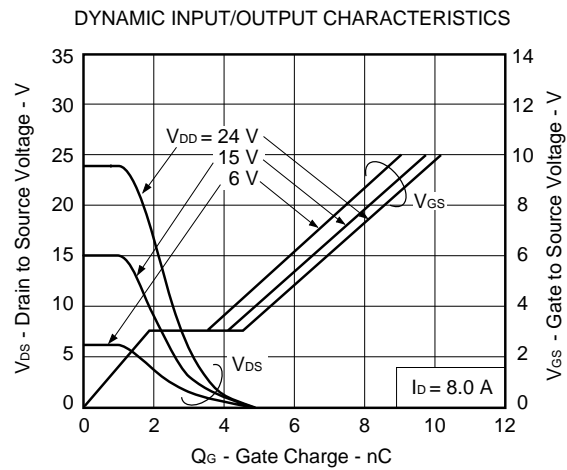
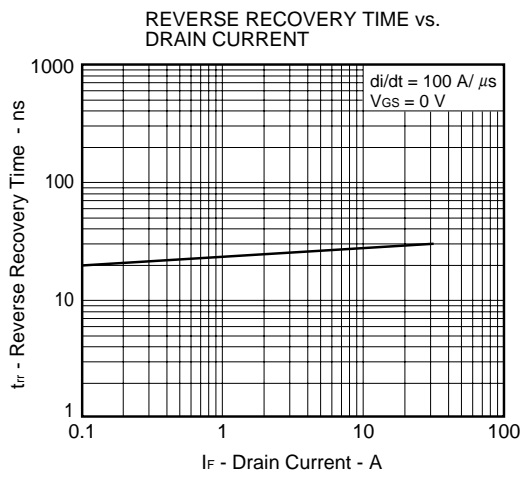
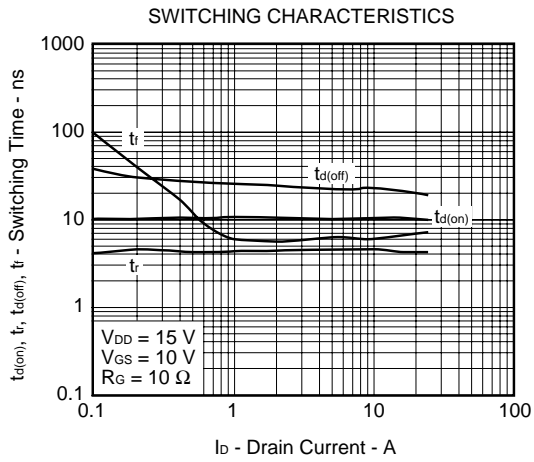
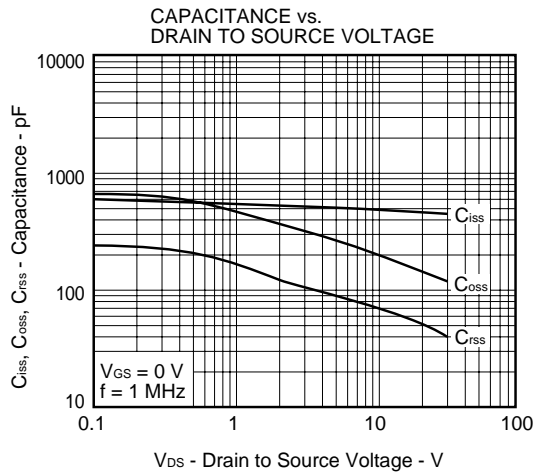
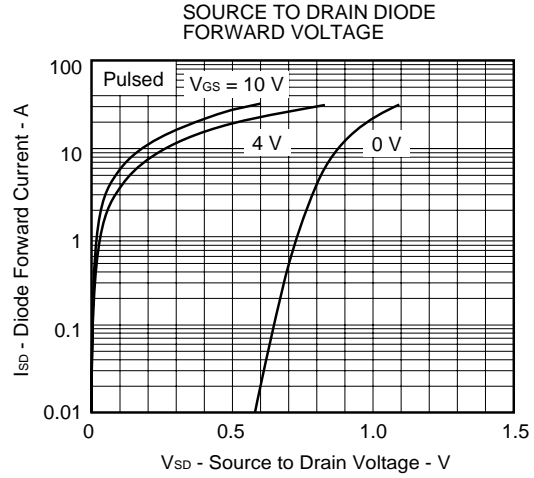
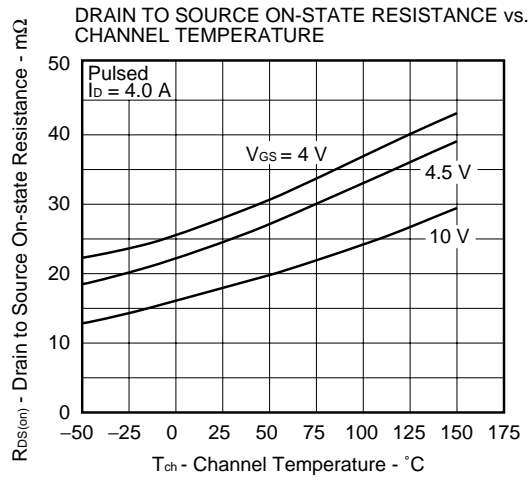
DRAIN TO SOURCE ON-STATE RESISTANCE vs. DRAIN CURRENT



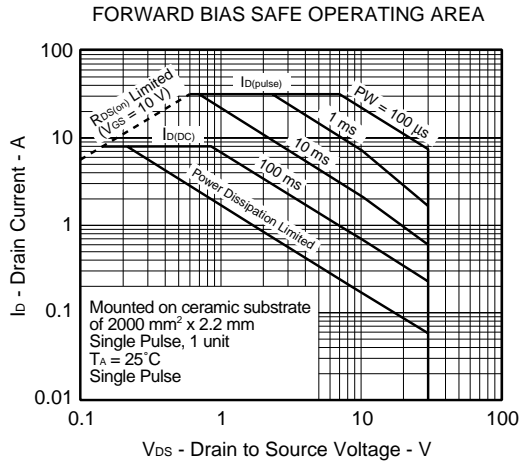
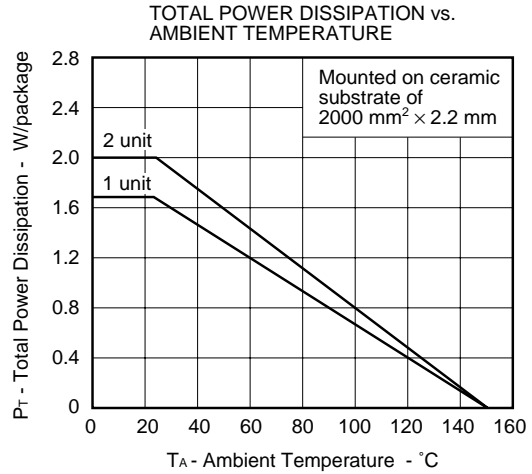
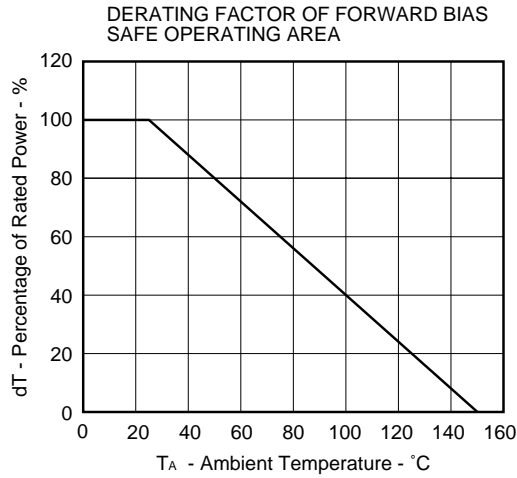
GATE CUT-OFF VOLTAGE vs. CHANNEL TEMPERATURE



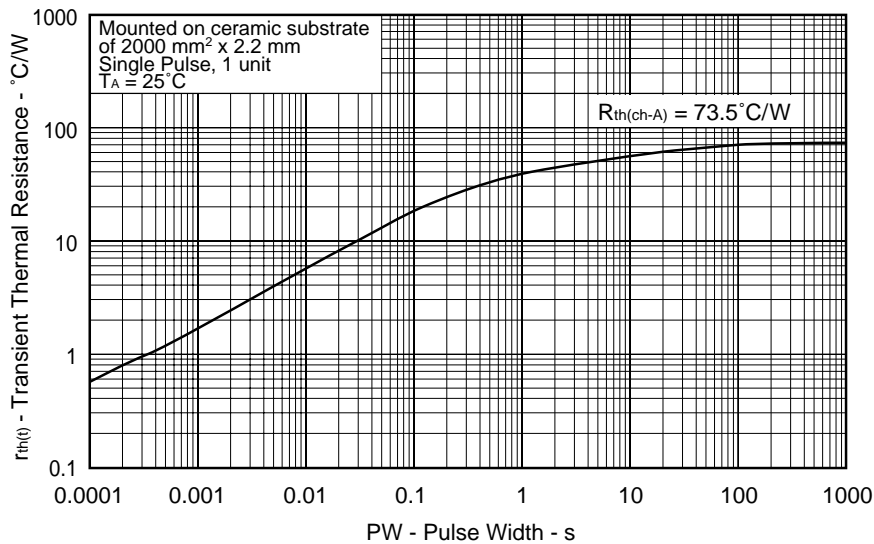
B) CH2



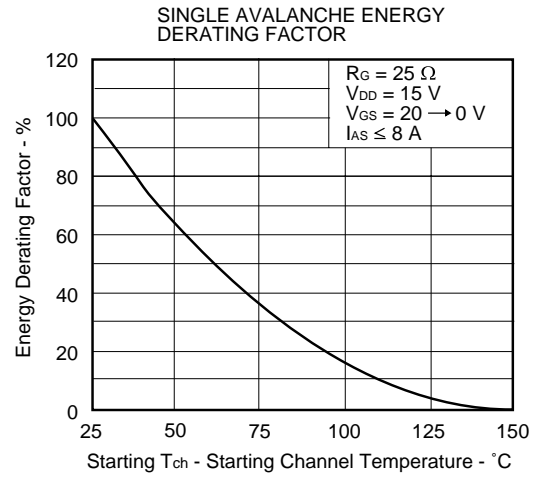
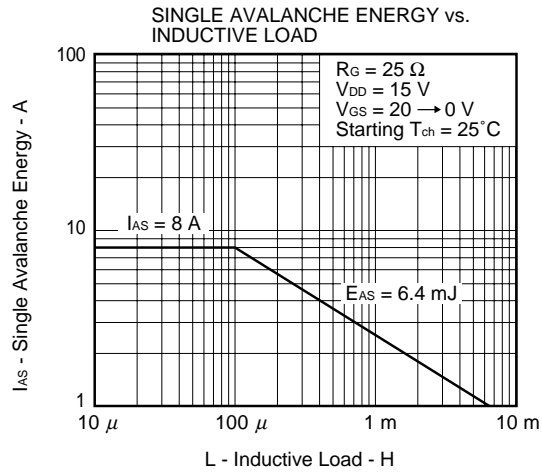
B) CH2



TRANSIENT THERMAL RESISTANCE vs. PULSE WIDTH



B) CH2



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