

P-CHANNEL MOS FIELD EFFECT TRANSISTOR FOR SWITCHING

DESCRIPTION

The μPA650TT is a switching device, which can be driven directly by a 1.8 V power source.

This device features a low on-state resistance and excellent switching characteristics, and is suitable for applications such as power switch of portable machine and so on.

FEATURES

- 1.8 V drive available
- Low on-state resistance
 $R_{DS(on)1} = 50 \text{ m}\Omega \text{ MAX. (} V_{GS} = -4.5 \text{ V, } I_D = -2.5 \text{ A)}$
 $R_{DS(on)2} = 68 \text{ m}\Omega \text{ MAX. (} V_{GS} = -2.5 \text{ V, } I_D = -2.5 \text{ A)}$
 $R_{DS(on)3} = 114 \text{ m}\Omega \text{ MAX. (} V_{GS} = -1.8 \text{ V, } I_D = -1.5 \text{ A)}$

ORDERING INFORMATION

PART NUMBER	PACKAGE
μPA650TT	6pinWSOF (1620)

Marking: WD

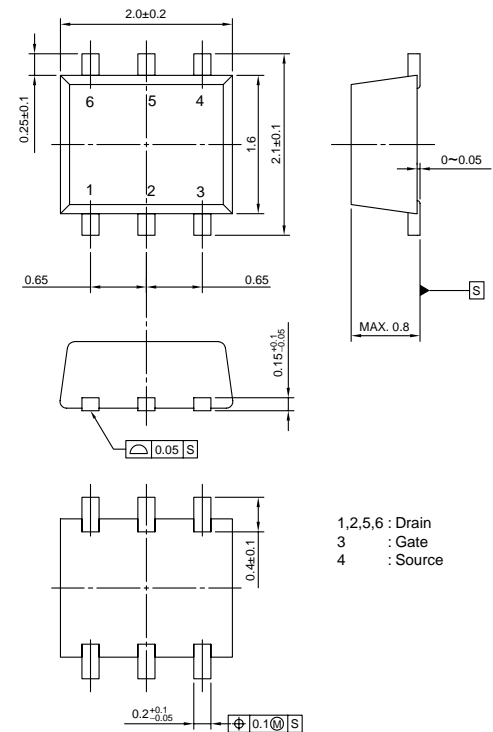
ABSOLUTE MAXIMUM RATINGS (T_A = 25°C)

Drain to Source Voltage (V _{GS} = 0 V)	V _{DSS}	-12	V
Gate to Source Voltage (V _{DS} = 0 V)	V _{GSS}	±8.0	V
Drain Current (DC) (T _A = 25°C)	I _{D(DC)}	±5.0	A
Drain Current (pulse) ^{Note1}	I _{D(pulse)}	±20	A
Total Power Dissipation (T _A = 25°C)	P _{T1}	0.2	W
Total Power Dissipation (T _A = 25°C) ^{Note2}	P _{T2}	1.4	W
Channel Temperature	T _{ch}	150	°C
Storage Temperature	T _{stg}	-55 to +150	°C

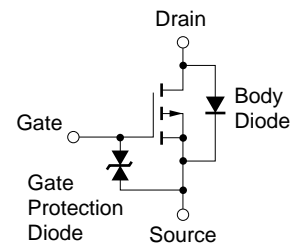
- Notes**
1. PW ≤ 10 μs, Duty Cycle ≤ 1%
 2. Mounted on FR-4 board, t ≤ 5 sec.

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.

PACKAGE DRAWING (Unit: mm)



EQUIVALENT CIRCUIT

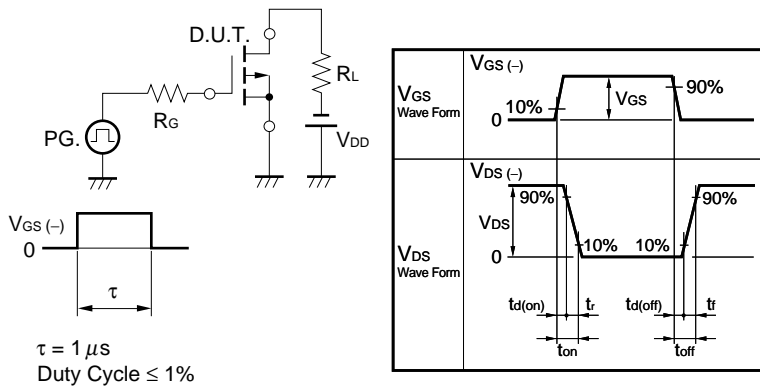


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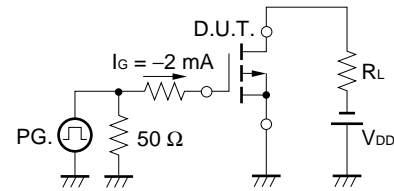
ELECTRICAL CHARACTERISTICS (TA = 25°C)

CHARACTERISTICS	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNIT
Zero Gate Voltage Drain Current	I_{DSS}	$V_{DS} = -12\text{ V}, V_{GS} = 0\text{ V}$			-10	μA
Gate Leakage Current	I_{GSS}	$V_{GS} = \mp 8.0\text{ V}, V_{DS} = 0\text{ V}$			±10	μA
Gate Cut-off Voltage	$V_{GS(off)}$	$V_{DS} = -10\text{ V}, I_D = -1.0\text{ mA}$	-0.45		-1.5	V
Forward Transfer Admittance	$ y_{fs} $	$V_{DS} = -10\text{ V}, I_D = -2.5\text{ A}$	4.0			S
Drain to Source On-state Resistance	$R_{DS(on)1}$	$V_{GS} = -4.5\text{ V}, I_D = -2.5\text{ A}$		40	50	mΩ
	$R_{DS(on)2}$	$V_{GS} = -2.5\text{ V}, I_D = -2.5\text{ A}$		51	68	mΩ
	$R_{DS(on)3}$	$V_{GS} = -1.8\text{ V}, I_D = -1.5\text{ A}$		68	114	mΩ
Input Capacitance	C_{iss}	$V_{DS} = -10\text{ V}$		610		pF
Output Capacitance	C_{oss}	$V_{GS} = 0\text{ V}$		150		pF
Reverse Transfer Capacitance	C_{rss}	$f = 1.0\text{ MHz}$		100		pF
Turn-on Delay Time	$t_{d(on)}$	$V_{DD} = -6.0\text{ V}, I_D = -2.5\text{ A}$		50		ns
Rise Time	t_r	$V_{GS} = -4.0\text{ V}$		200		ns
Turn-off Delay Time	$t_{d(off)}$	$R_G = 10\ \Omega$		400		ns
Fall Time	t_f			315		ns
Total Gate Charge	Q_G	$V_{DD} = -10\text{ V}$		5.5		nC
Gate to Source Charge	Q_{GS}	$V_{GS} = -4.0\text{ V}$		1.5		nC
Gate to Drain Charge	Q_{GD}	$I_D = -5.0\text{ A}$		1.6		nC
Body Diode Forward Voltage	$V_{F(S-D)}$	$I_F = 5.0\text{ A}, V_{GS} = 0\text{ V}$		0.89		V

TEST CIRCUIT 1 SWITCHING TIME

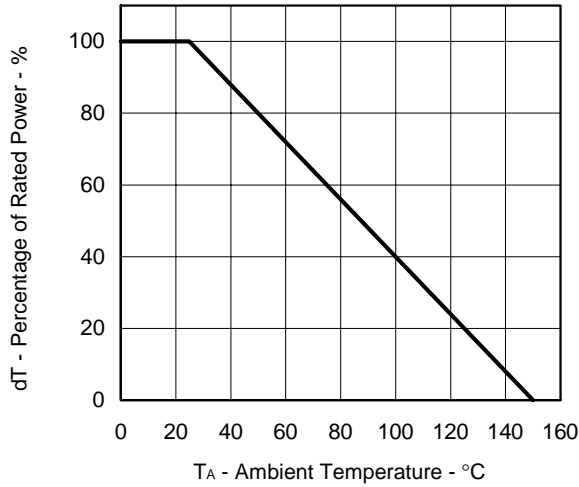


TEST CIRCUIT 2 GATE CHARGE

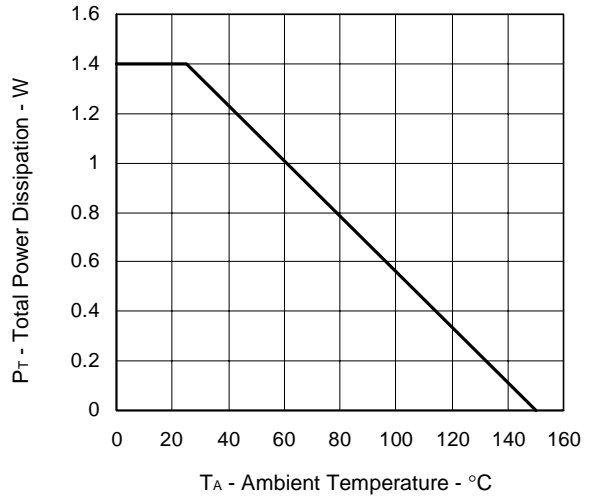


TYPICAL CHARACTERISTICS (T_A = 25°C)

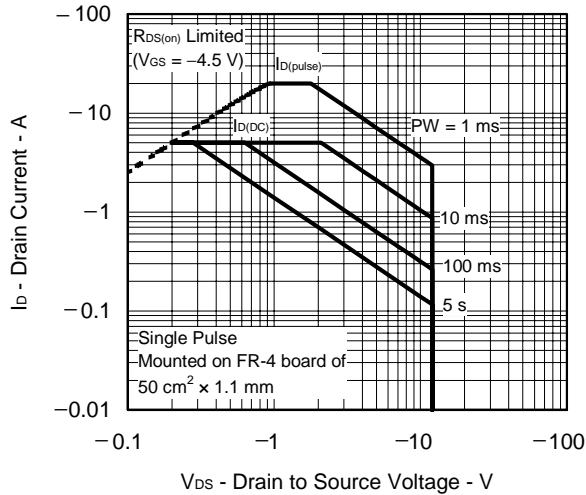
DERATING FACTOR OF FORWARD BIAS SAFE OPERATING AREA



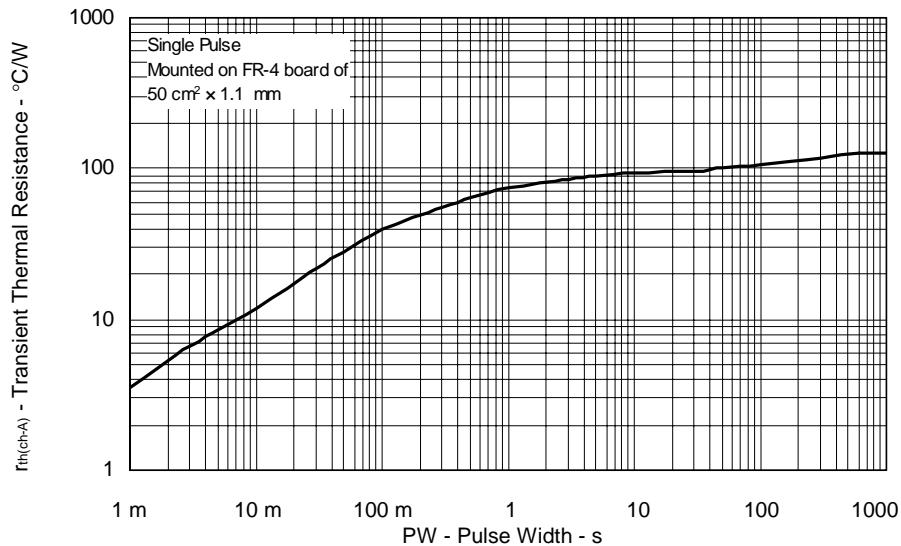
TOTAL POWER DISSIPATION vs. AMBIENT TEMPERATURE



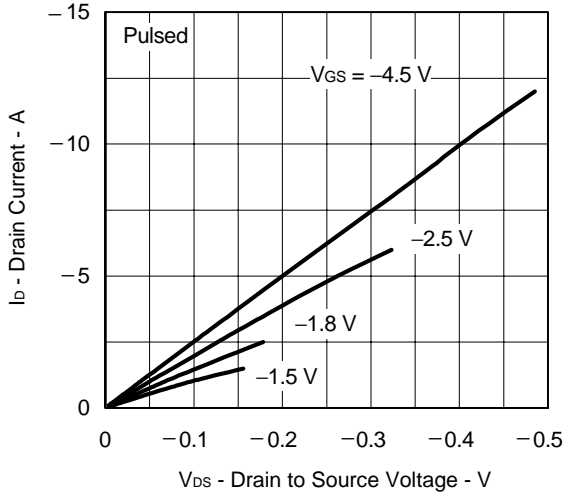
FORWARD BIAS SAFE OPERATING AREA



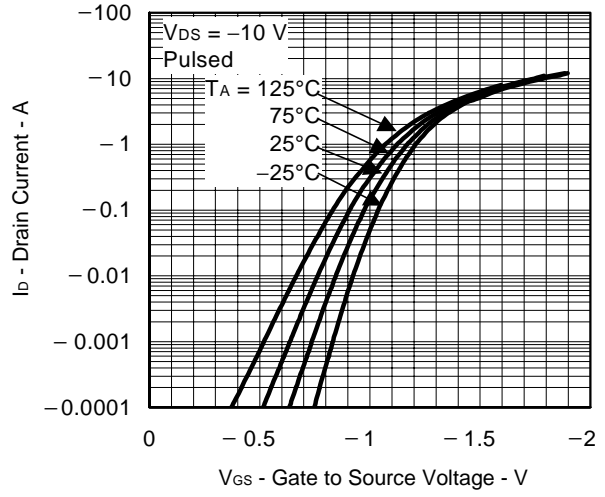
TRANSIENT THERMAL RESISTANCE vs. PULSE WIDTH



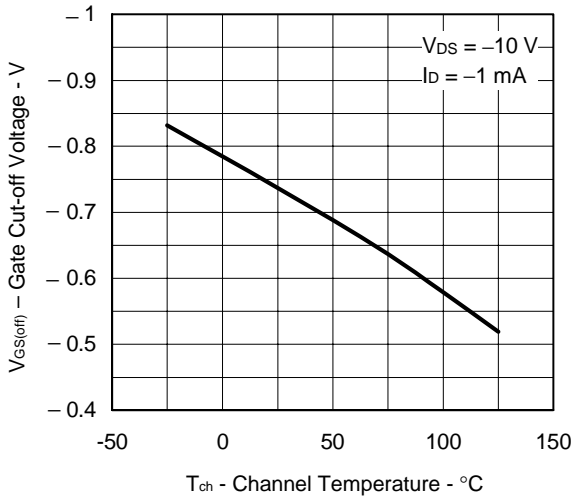
DRAIN CURRENT vs. DRAIN TO SOURCE VOLTAGE



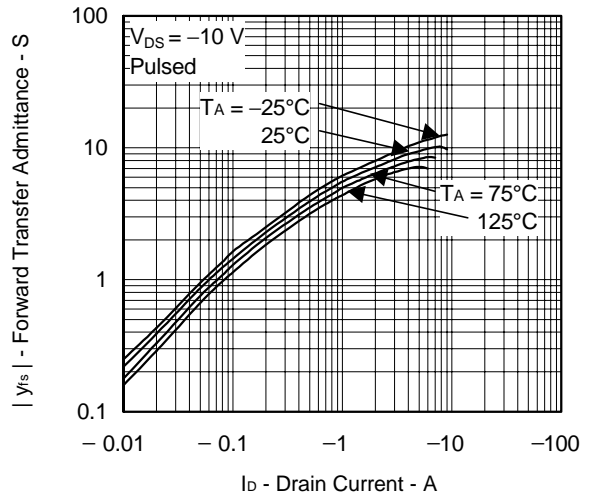
FORWARD TRANSFER CHARACTERISTICS



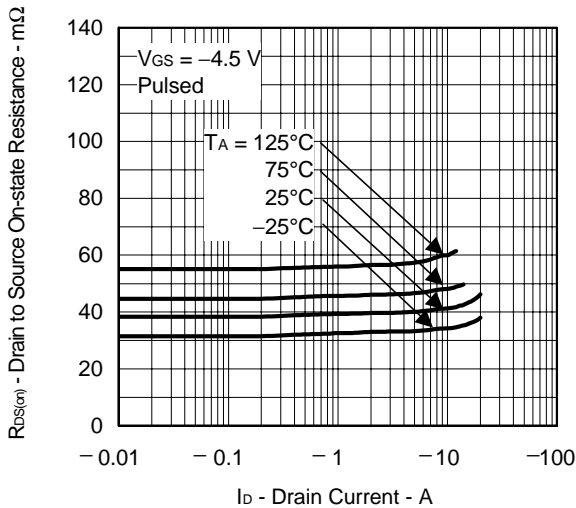
GATE CUT-OFF VOLTAGE vs. CHANNEL TEMPERATURE



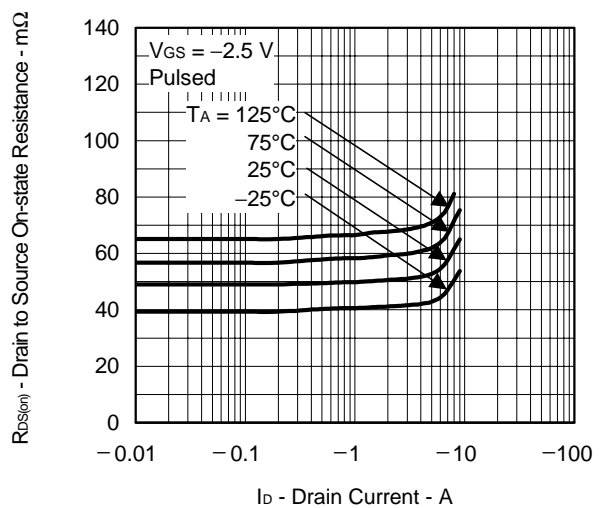
FORWARD TRANSFER ADMITTANCE vs. DRAIN CURRENT



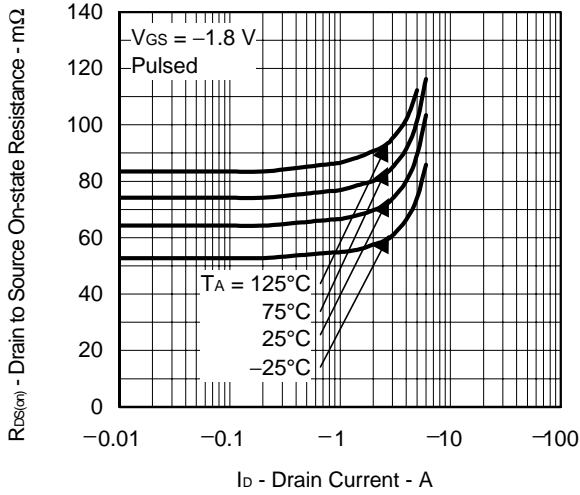
DRAIN TO SOURCE ON-STATE RESISTANCE vs. DRAIN CURRENT



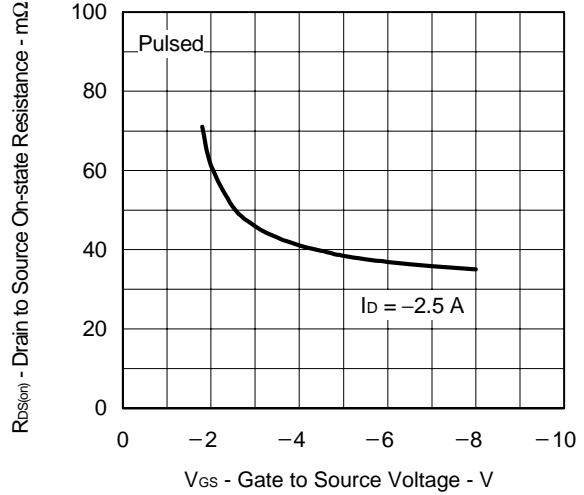
DRAIN TO SOURCE ON-STATE RESISTANCE vs. DRAIN CURRENT



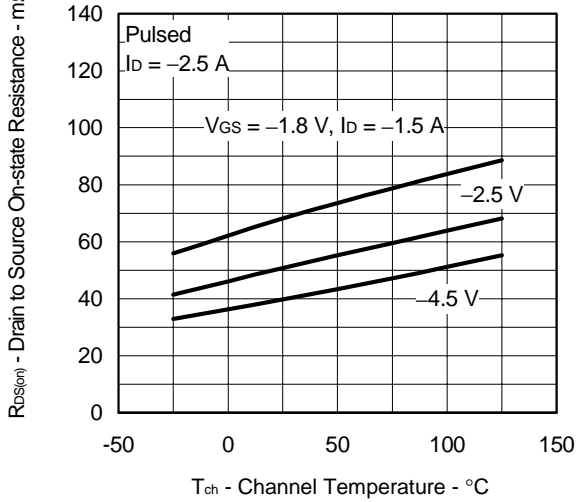
DRAIN TO SOURCE ON-STATE RESISTANCE vs. DRAIN CURRENT



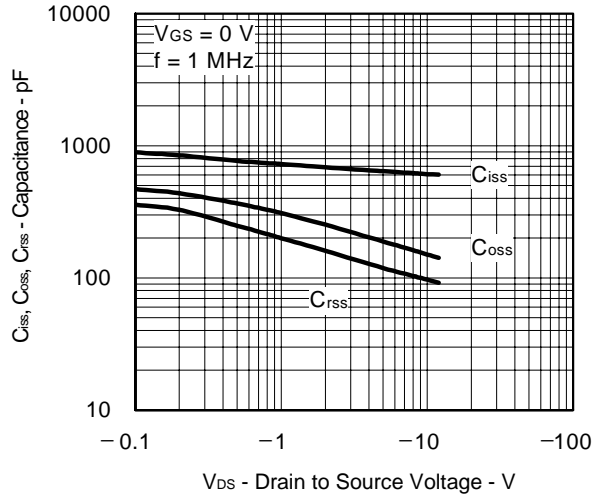
DRAIN TO SOURCE ON-STATE RESISTANCE vs. GATE TO SOURCE VOLTAGE



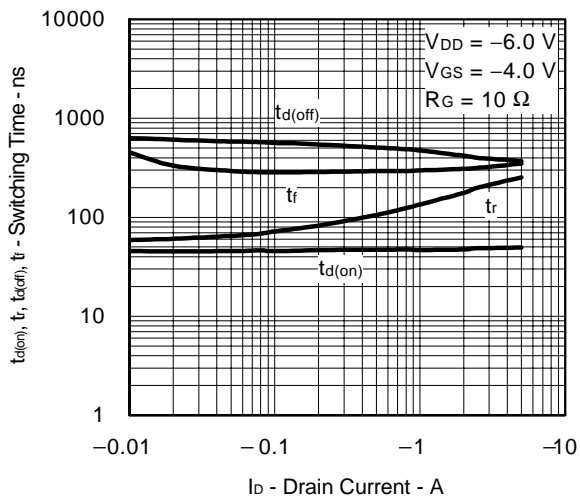
DRAIN TO SOURCE ON-STATE RESISTANCE vs. CHANNEL TEMPERATURE



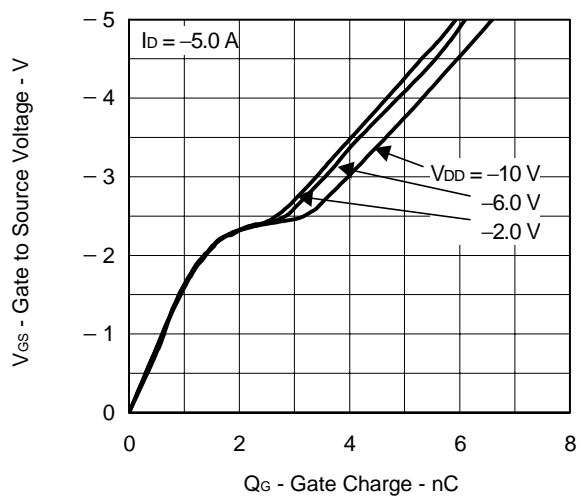
CAPACITANCE vs. DRAIN TO SOURCE VOLTAGE



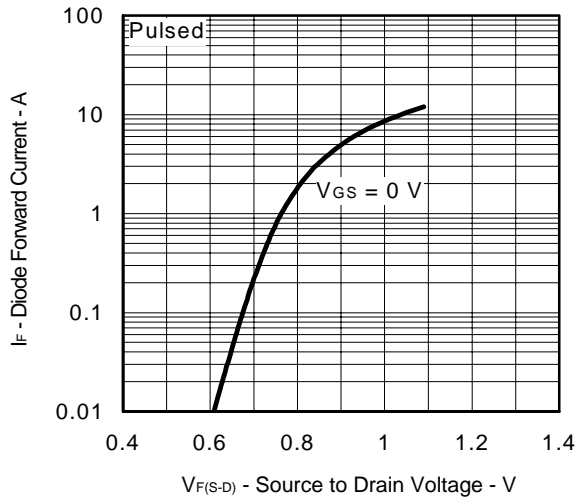
SWITCHING CHARACTERISTICS



DYNAMIC INPUT/OUTPUT CHARACTERISTICS



SOURCE TO DRAIN DIODE
FORWARD VOLTAGE



[MEMO]

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