DATA SHEET

NEC

MOS FIELD EFFECT TRANSISTOR
μPA1740TP

SWITCHING
N-CHANNEL POWER MOS FET

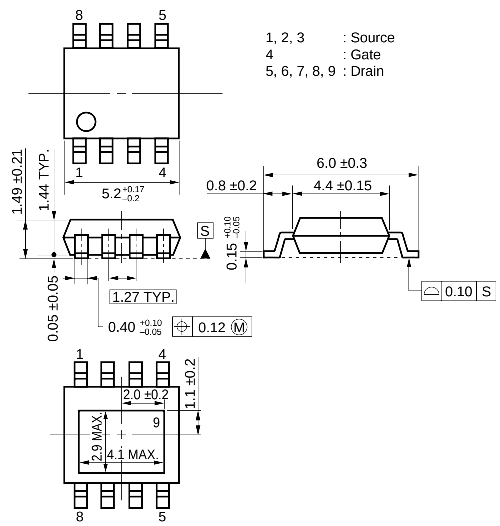
DESCRIPTION

The μPA1740TP is N-channel MOS FET device that features a low on-state resistance and excellent swiching characteristics, and designed for high voltage applications such as DC/DC converter.

FEATURES

- High voltage: V_{DSS} = 200 V
- Gate voltage rating: ±30 V
- Low on-state resistance
  $R_{DS(on)}$ = 0.44 Ω MAX. (V_{GS} = 10 V, I_D = 3.5 A)
- Low input capacitance
  C_{iss} = 420 pF TYP. (V_{DS} = 10 V, V_{GS} = 0 V)
- Built-in gate protection diode
- Small and surface mount package (Power HSOP8)
- Avalanche capability rated

PACKAGE DRAWING (Unit: mm)



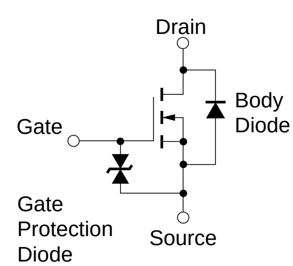
ORDERING INFORMATION

PART NUMBER	PACKAGE
μPA1740TP	Power HSOP8

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

Drain to Source Voltage (V_{GS} = 0 V)	V_{DSS}	200	V
Gate to Source Voltage (V_{DS} = 0 V)	V_{GSS}	±30	V
Drain Current (DC) (T_C = 25°C)	$I_{D(DC)}$	±7.0	A
Drain Current (pulse) Note1	$I_{D(pulse)}$	±21	A
Total Power Dissipation (T_C = 25°C)	P_{T1}	22	W
Total Power Dissipation (T_A = 25°C) Note2	P_{T2}	1.0	W
Channel Temperature	T_{ch}	150	°C
Storage Temperature	T_{stg}	–55 to + 150	°C
Single Avalanche Current Note3	I_{AS}	7.0	A
Single Avalanche Energy Note3	E_{AS}	4.9	mJ
Repetitive Avalanche Current Note4	I_{AR}	7.0	A
Repetitive Avalanche Energy Note4	E_{AR}	2.2	mJ

EQUIVALENT CIRCUIT



Notes 1. PW ≤ 10 μs, Duty Cycle ≤ 1%

2. Mounted on a glass epoxy board (1 inch x 1 inch x 0.8 mm), PW = 10 sec

3. Starting T_{ch} = 25°C, V_{DD} = 100 V, R_G = 25 Ω, L = 100 μH, V_{GS} = 20 → 0 V

4. T_{ch} ≤ 125°C, V_{DD} = 100 V, R_G = 25 Ω

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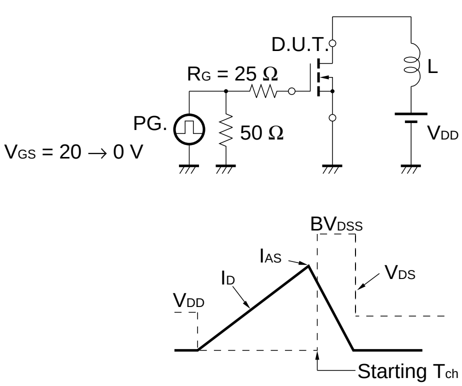
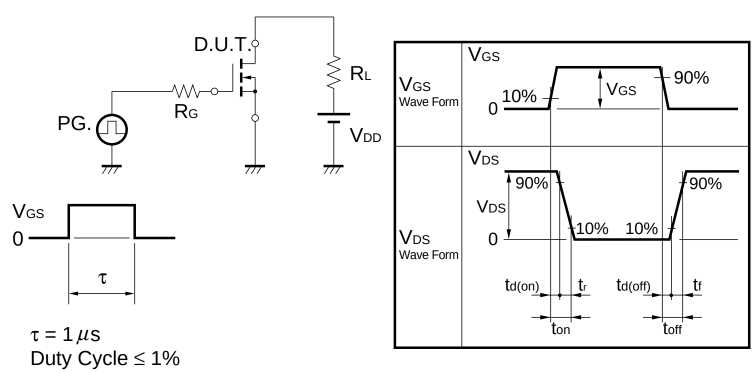
ELECTRICAL CHARACTERISTICS (T_A = 25°C, Unless otherwise noted, All terminals are connected.)

CHARACTERISTICS	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNIT
Zero Gate Voltage Drain Current	I_{DSS}	V_{DS} = 200 V, V_{GS} = 0 V			10	μA
Gate Leakage Current	I_{GSS}	V_{GS} = ±30 V, V_{DS} = 0 V			±10	μA
Gate Cut-off Voltage	$V_{GS(off)}$	V_{DS} = 10 V, I_D = 1.0 mA	2.5	3.5	4.5	V
Forward Transfer Admittance	$\|y_{fs}\|$	V_{DS} = 10 V, I_D = 3.5 A	3	4.5		S
Drain to Source On-state Resistance	$R_{DS(on)}$	V_{GS} = 10 V, I_D = 3.5 A		0.35	0.44	Ω
Input Capacitance	C_{iss}	V_{DS} = 10 V		420		pF
Output Capacitance	C_{oss}	V_{GS} = 0 V		100		pF
Reverse Transfer Capacitance	C_{rss}	f = 1 MHz		45		pF
Turn-on Delay Time	$t_{d(on)}$	V_{DD} = 100 V, I_D = 3.5 A		5		ns
Rise Time	t_r	V_{GS} = 10 V		7.5		ns
Turn-off Delay Time	$t_{d(off)}$	R_G = 10 Ω		21		ns
Fall Time	t_f			7		ns
Total Gate Charge	Q_G	V_{DD} = 160 V		12		nC
Gate to Source Charge	Q_{GS}	V_{GS} = 10 V		2		nC
Gate to Drain Charge	Q_{GD}	I_D = 7.0 A		6.5		nC
Body Diode Forward Voltage	$V_{F(S-D)}$	I_F = 7.0 A, V_{GS} = 0 V		1.0	1.5	V
Reverse Recovery Time	t_{rr}	I_F = 7.0 A, V_{GS} = 0 V		110		ns
Reverse Recovery Charge	Q_{rr}	di/dt = 50 A/μs		360		nC

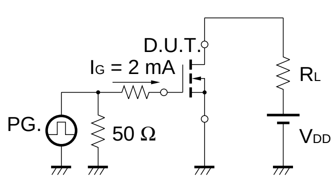
TEST CIRCUIT 1 AVALANCHE CAPABILITY



TEST CIRCUIT 2 SWITCHING TIME

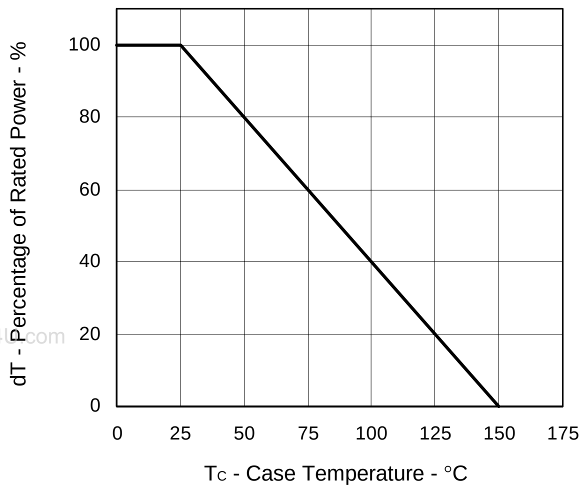


TEST CIRCUIT 3 GATE CHARGE

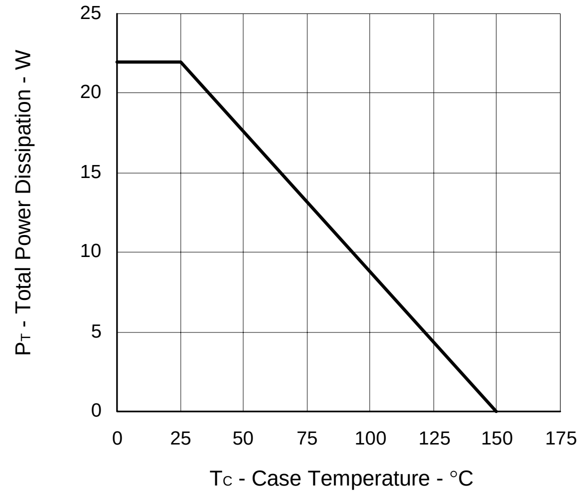


TYPICAL CHARACTERISTICS (T_A = 25°C)

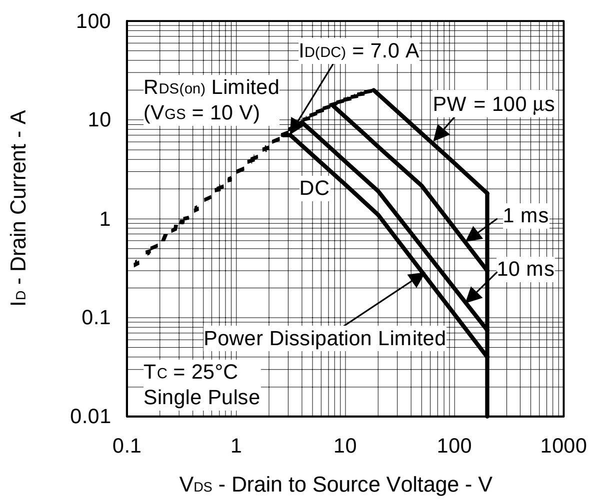
DERATING FACTOR OF FORWARD BIAS
SAFE OPERATING AREA



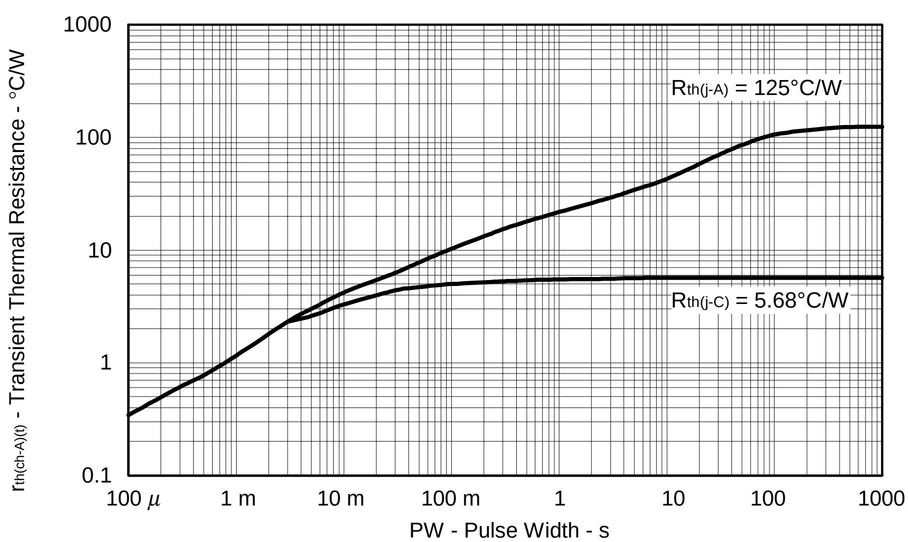
TOTAL POWER DISSIPATION vs.
CASE TEMPERATURE



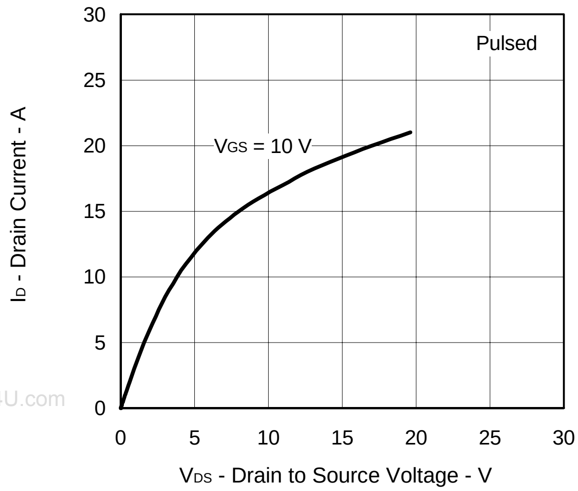
FORWARD BIAS SAFE OPERATING AREA



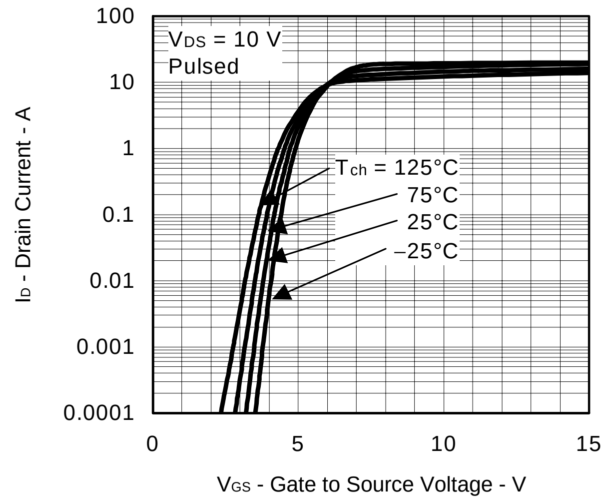
TRANSIENT THERMAL RESISTANCE vs. PULSE WIDTH



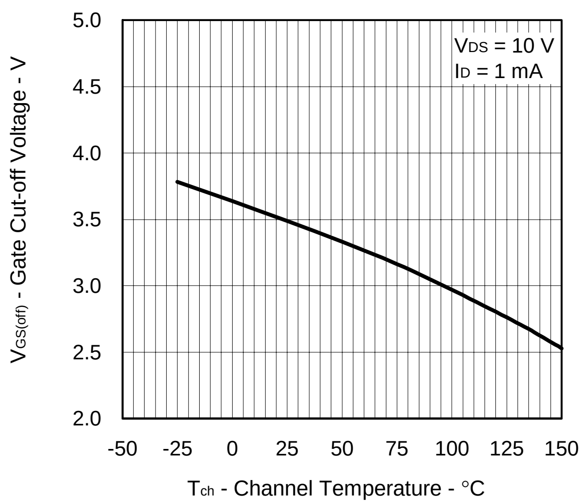
DRAIN CURRENT vs.
DRAIN TO SOURCE VOLTAGE



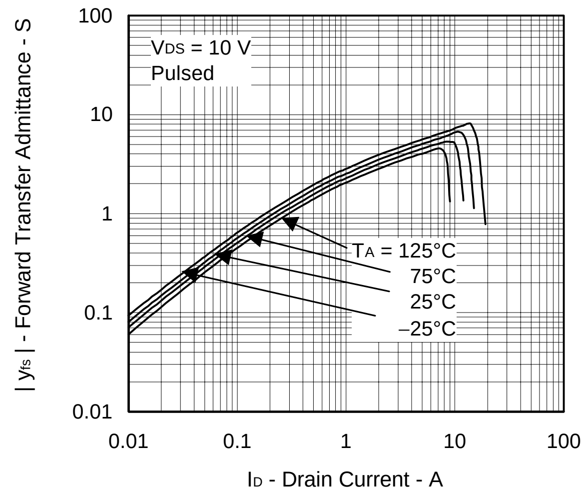
FORWARD TRANSFER CHARACTERISTICS



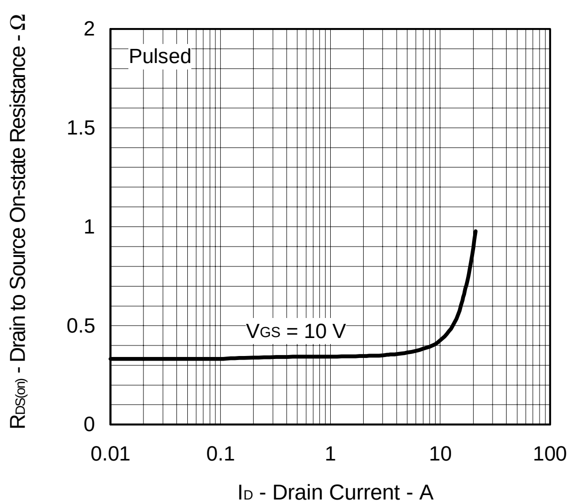
GATE CUT-OFF VOLTAGE vs.
CHANNEL TEMPERATURE



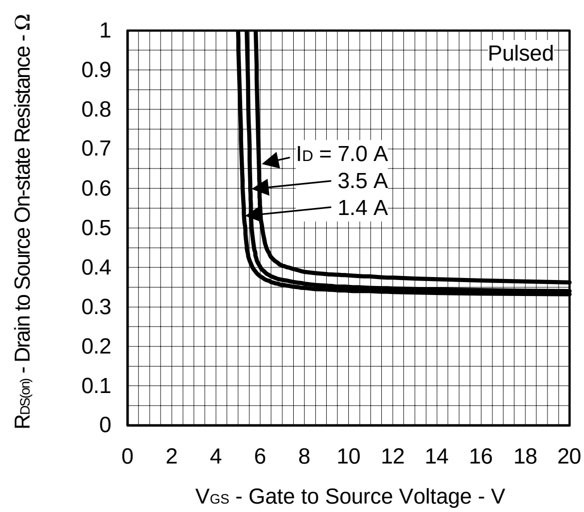
FORWARD TRANSFER ADMITTANCE vs.
DRAIN CURRENT



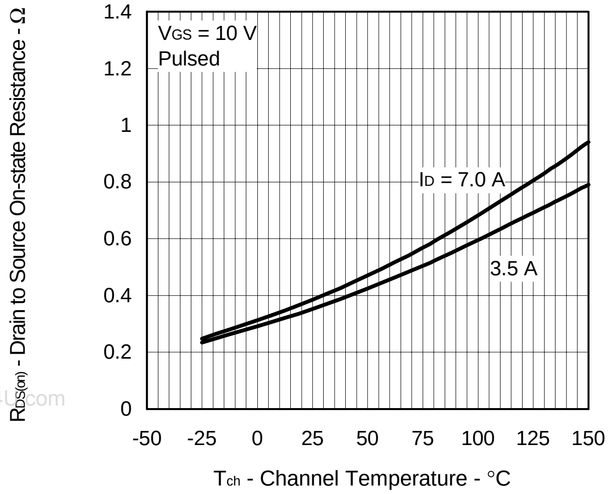
DRAIN TO SOURCE ON-STATE
RESISTANCE vs. DRAIN CURRENT



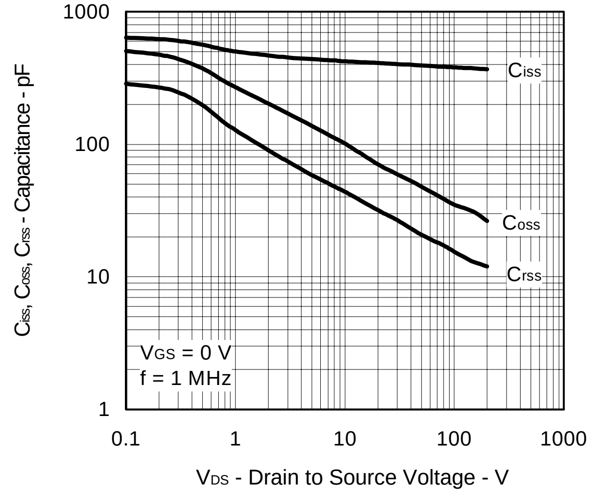
DRAIN TO SOURCE ON-STATE RESISTANCE vs.
GATE TO SOURCE VOLTAGE



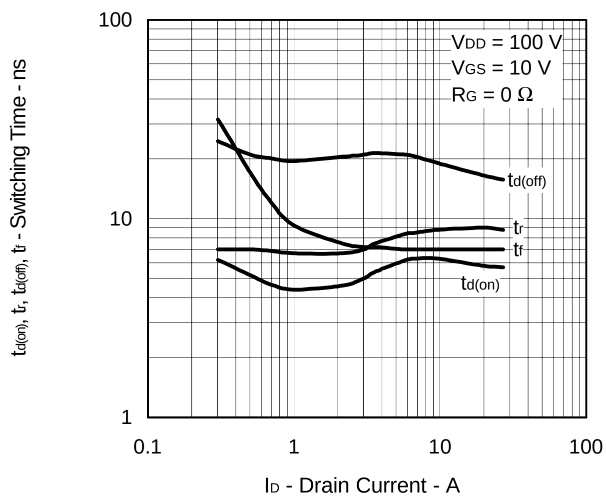
DRAIN TO SOURCE ON-STATE RESISTANCE vs.
CHANNEL TEMPERATURE



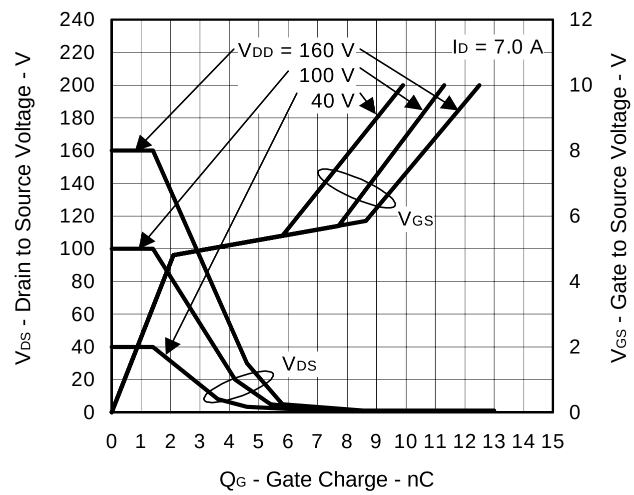
CAPACITANCE vs.
DRAIN TO SOURCE VOLTAGE



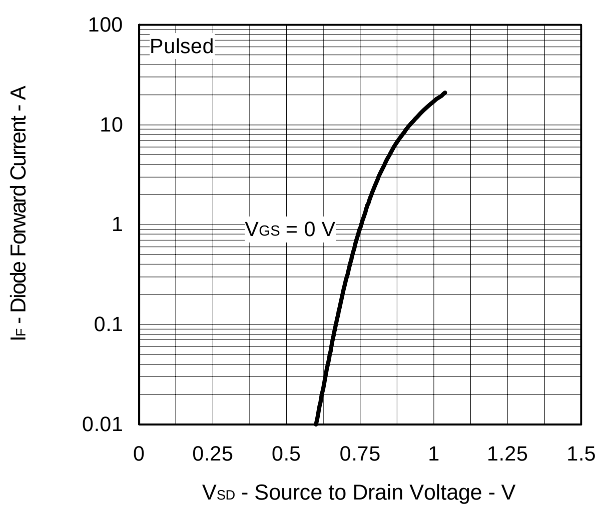
SWITCHING CHARACTERISTICS



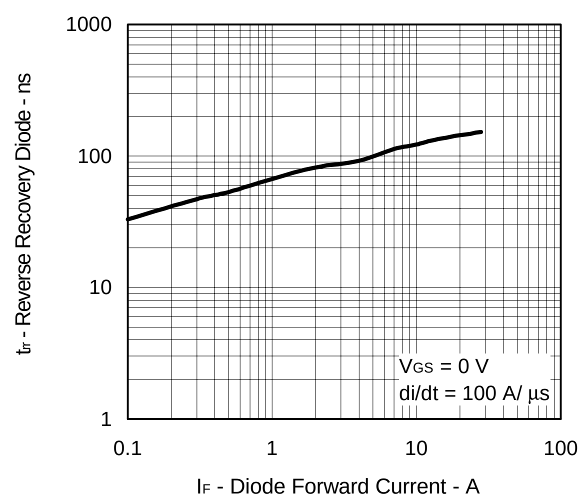
DYNAMIC INPUT/OUTPUT CHARACTERISTICS



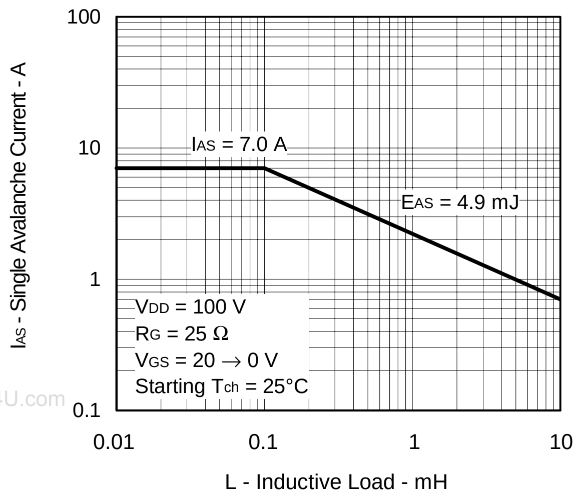
SOURCE TO DRAIN DIODE
FORWARD VOLTAGE



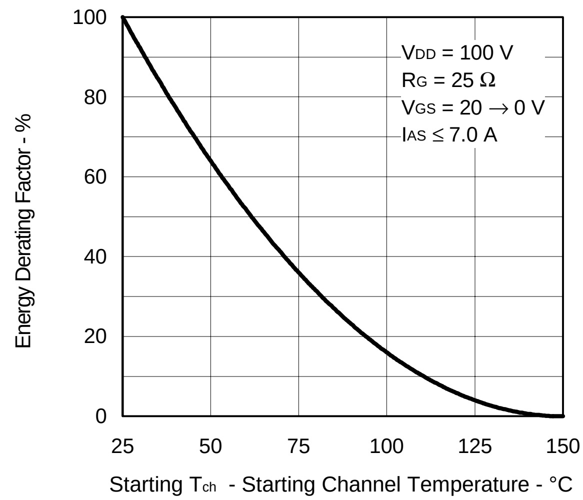
REVERSE RECOVERY TIME vs.
DIODE FORWARD CURRENT



SINGLE AVALANCHE CURRENT vs.
INDUCTIVE LOAD



SINGLE AVALANCHE ENERGY
DERATING FACTOR



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