

MOS FET WITH SCHOTTKY BARRIER DIODE μ PA507TE

P-CHANNEL MOS FET WITH SCHOTTKY BARRIER DIODE FOR SWITCHING

DESCRIPTION

The μ PA507TE is a switching device, which can be driven directly by a 1.8 V power source.

This device incorporates a MOS FET, which features a low on-state resistance and excellent switching characteristics and a low forward voltage Schottky barrier diode, and is suitable for applications such as DC/DC converter of portable machine and so on.

FEATURES

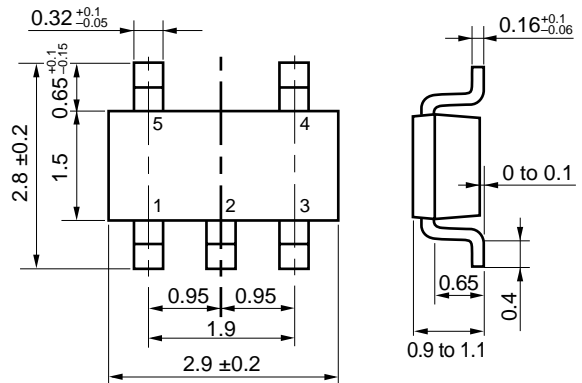
- 1.8 V drive available (MOS FET)
- Low on-state resistance (MOS FET)
 - $R_{DS(on)1} = 68 \text{ m}\Omega$ TYP. ($V_{GS} = -4.5 \text{ V}$, $I_D = -1.0 \text{ A}$)
 - $R_{DS(on)2} = 84 \text{ m}\Omega$ TYP. ($V_{GS} = -2.5 \text{ V}$, $I_D = -1.0 \text{ A}$)
 - $R_{DS(on)3} = 109 \text{ m}\Omega$ TYP. ($V_{GS} = -1.8 \text{ V}$, $I_D = -1.0 \text{ A}$)
- Low forward voltage (Schottky barrier diode)
 - $V_F = 0.35 \text{ V}$ TYP. ($I_F = 1.0 \text{ A}$)

ORDERING INFORMATION

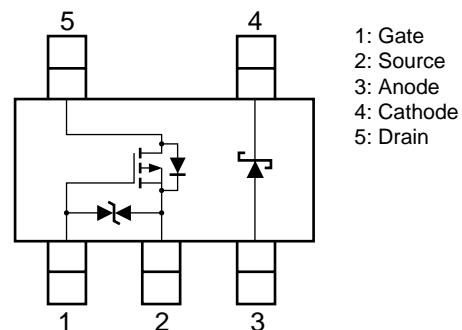
PART NUMBER	PACKAGE
μ PA507TE	SC-95_5p (Mini Mold Thin Type)

Marking: ZA

PACKAGE DRAWING (Unit: mm)



★ PIN CONNECTION (Top View)



- 1: Gate
- 2: Source
- 3: Anode
- 4: Cathode
- 5: Drain

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.

Caution This product is electrostatic-sensitive device due to low ESD capability and should be handled with caution for electrostatic discharge.

$V_{ESD} \pm 100 \text{ V}$ TYP. ($C = 200 \text{ pF}$, $R = 0 \Omega$, Single pulse)

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MOS FET ABSOLUTE MAXIMUM RATINGS (T_A = 25°C)

Drain to Source Voltage (V _{GS} = 0 V)	V _{DSS}	-20	V
Gate to Source Voltage (V _{DS} = 0 V)	V _{GSS}	±8	V
Drain Current (DC)	I _{D(DC)}	±2	A
Drain Current (pulse) ^{Note1}	I _{D(pulse)}	±8	A
Total Power Dissipation ^{Note2}	P _T	0.57	W
Channel Temperature	T _{ch}	150	°C

Notes 1. PW ≤ 10 μs, Duty Cycle ≤ 1%

2. Mounted on FR-4 board of 2500 mm² x 1.6 mm, t ≤ 5 sec.

SCHOTTKY BARRIER DIODE ABSOLUTE MAXIMUM RATINGS (T_A = 25°C)

Repetitive Peak Reverse Voltage	V _{RRM}	30	V
Average Forward Current ^{Note3}	I _{F(AV)}	1	A
Surge Current ^{Note4}	I _{FSM}	10	A
Junction Temperature	T _j	+125	°C
Storage Temperature	T _{stg}	-55 to +125	°C

Notes 3. Mounted on FR-4 board of 2500 mm² x 1.6 mm, t ≤ 5 sec

4. 50 Hz sine wave, 1 cycle

MOS FET ELECTRICAL CHARACTERISTICS (TA = 25°C)

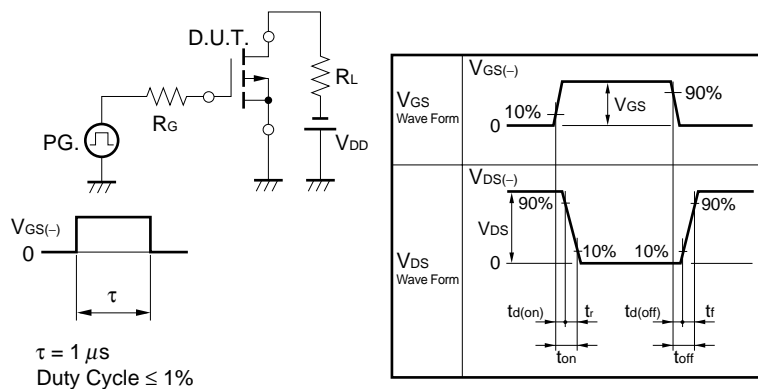
CHARACTERISTICS	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNIT
Zero Gate Voltage Drain Current	I_{DSS}	$V_{DS} = -20\text{ V}, V_{GS} = 0\text{ V}$			-1	μA
Gate Leakage Current	I_{GSS}	$V_{GS} = \mp 8\text{ V}, V_{DS} = 0\text{ V}$			∓ 10	μA
Gate Cut-off Voltage	$V_{GS(off)}$	$V_{DS} = -10\text{ V}, I_D = -1.0\text{ mA}$	-0.45	-0.75	-1.50	V
Forward Transfer Admittance ^{Note}	$ y_{fs} $	$V_{DS} = -10\text{ V}, I_D = -1.0\text{ A}$	2.0	4.3		S
Drain to Source On-state Resistance ^{Note}	$R_{DS(on)1}$	$V_{GS} = -4.5\text{ V}, I_D = -1.0\text{ A}$		68	85	$\text{m}\Omega$
	$R_{DS(on)2}$	$V_{GS} = -2.5\text{ V}, I_D = -1.0\text{ A}$		84	120	$\text{m}\Omega$
	$R_{DS(on)3}$	$V_{GS} = -1.8\text{ V}, I_D = -1.0\text{ A}$		109	180	$\text{m}\Omega$
Input Capacitance	C_{iss}	$V_{DS} = -10\text{ V}$		380		pF
Output Capacitance	C_{oss}	$V_{GS} = 0\text{ V}$		85		pF
Reverse Transfer Capacitance	C_{rss}	$f = 1.0\text{ MHz}$		45		pF
Turn-on Delay Time	$t_{d(on)}$	$V_{DD} = -10\text{ V}, I_D = -1.0\text{ A}$		10		ns
Rise Time	t_r	$V_{GS} = -4.0\text{ V}$		5		ns
Turn-off Delay Time	$t_{d(off)}$	$R_G = 10\ \Omega$		47		ns
Fall Time	t_f			28		ns
Total Gate Charge	Q_G	$V_{DD} = -16\text{ V}$		4.7		nC
Gate to Source Charge	Q_{GS}	$V_{GS} = -4.0\text{ V}$		0.9		nC
Gate to Drain Charge	Q_{GD}	$I_D = -2.0\text{ A}$		1.5		nC
Body Diode Forward Voltage ^{Note}	$V_{F(S-D)}$	$I_F = 2.0\text{ A}, V_{GS} = 0\text{ V}$		0.84		V

Note Pulsed: $PW \leq 350\ \mu\text{s}$, Duty Cycle $\leq 2\%$

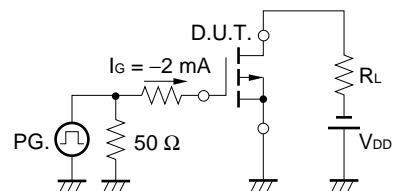
SCHOTTKY BARRIER DIODE ELECTRICAL CHARACTERISTICS (TA = 25°C)

CHARACTERISTICS	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNIT
Forward Voltage	V_F	$I_F = 1.0\text{ A}$		0.35	0.38	V
Reverse Current	I_R	$V_R = 10\text{ V}$			200	μA
Terminal Capacitance	C_T	$f = 1.0\text{ MHz}, V_R = 10\text{ V}$		36		pF

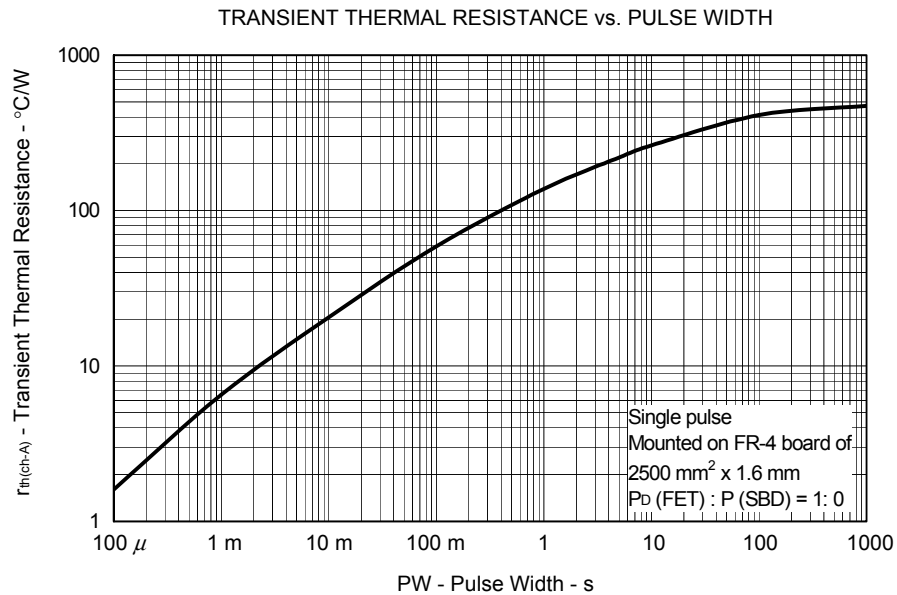
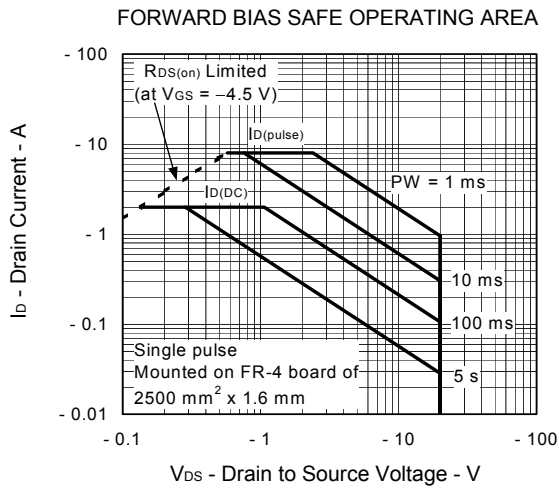
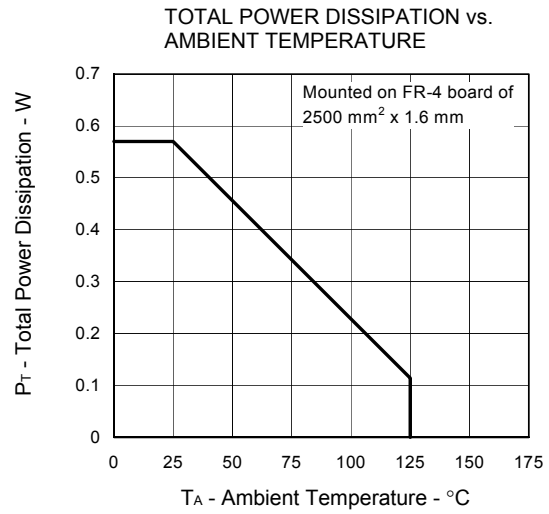
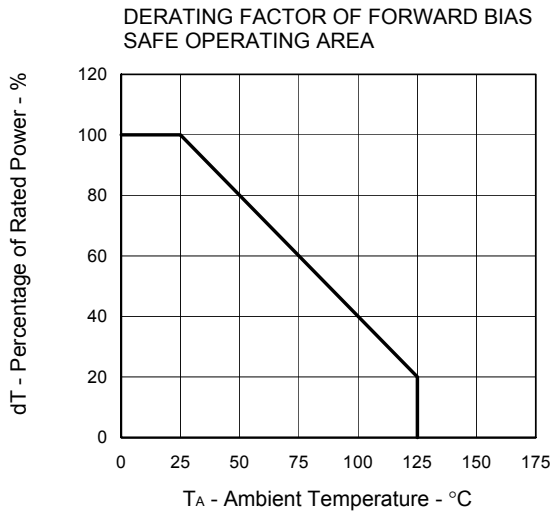
TEST CIRCUIT 1 SWITCHING TIME



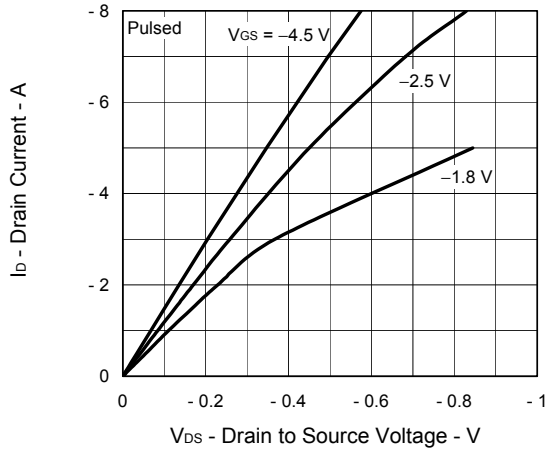
TEST CIRCUIT 2 GATE CHARGE



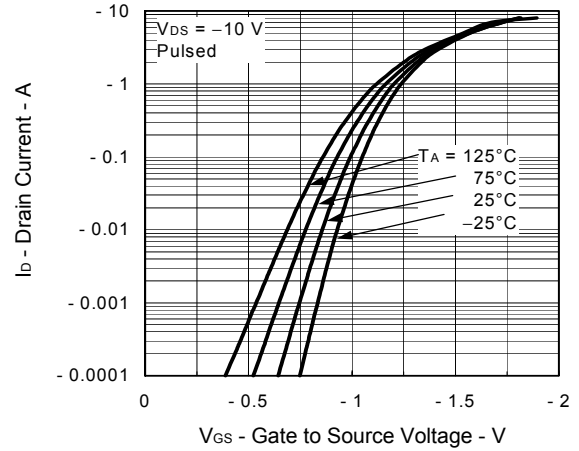
MOS FET TYPICAL CHARACTERISTICS ($T_A = 25^\circ\text{C}$)



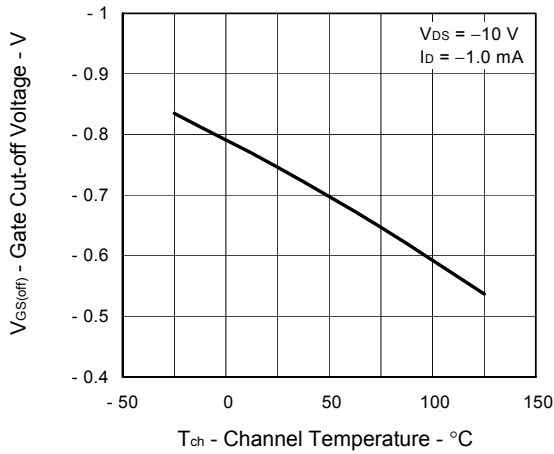
DRAIN CURRENT vs. DRAIN TO SOURCE VOLTAGE



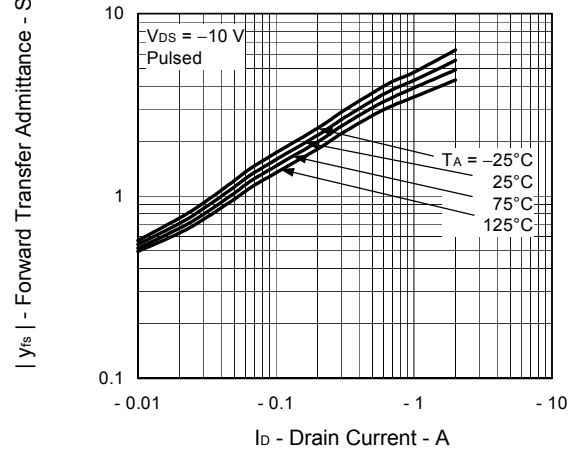
FORWARD TRANSFER CHARACTERISTICS



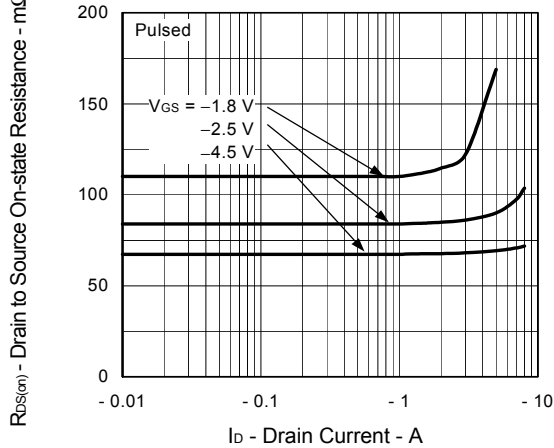
GATE CUT-OFF VOLTAGE vs. CHANNEL TEMPERATURE



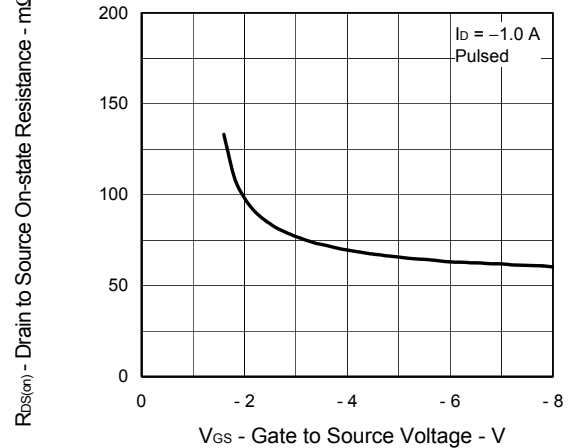
FORWARD TRANSFER ADMITTANCE vs. DRAIN CURRENT



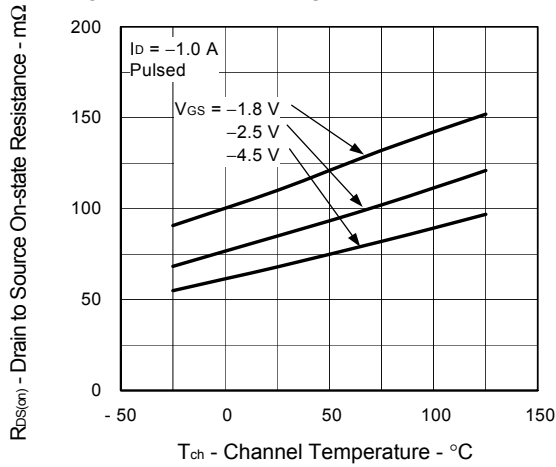
DRAIN TO SOURCE ON-STATE RESISTANCE vs. DRAIN CURRENT



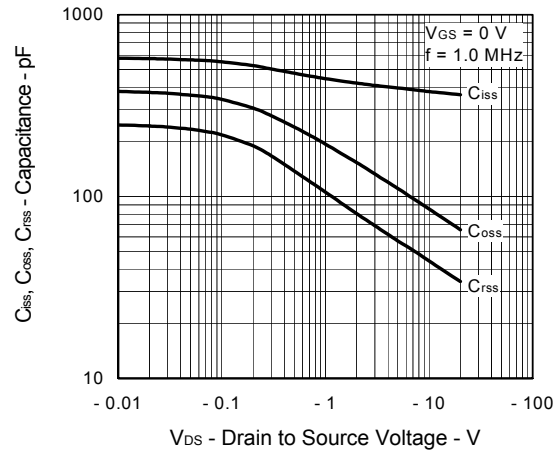
DRAIN TO SOURCE ON-STATE RESISTANCE vs. GATE TO SOURCE VOLTAGE



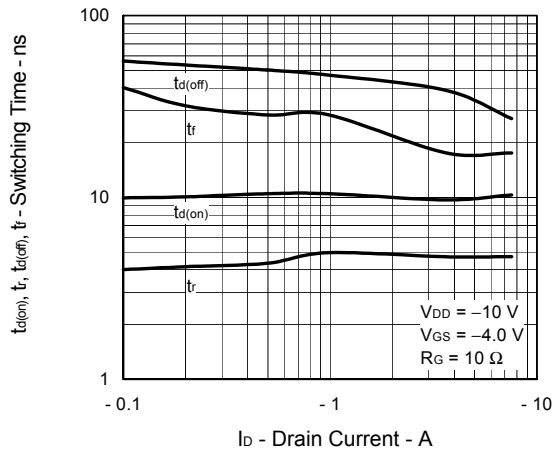
DRAIN TO SOURCE ON-STATE RESISTANCE vs. CHANNEL TEMPERATURE



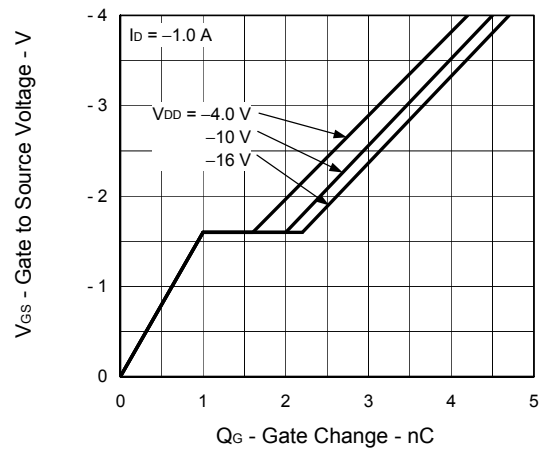
CAPACITANCE vs. DRAIN TO SOURCE VOLTAGE



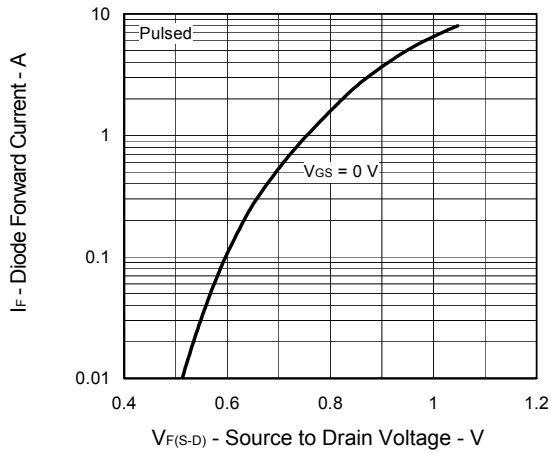
SWITCHING CHARACTERISTICS



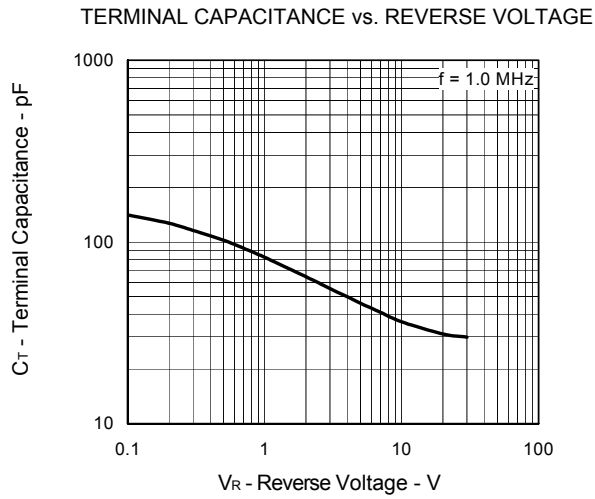
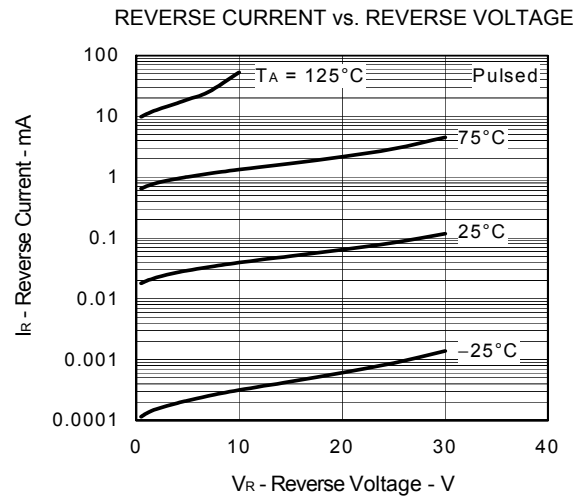
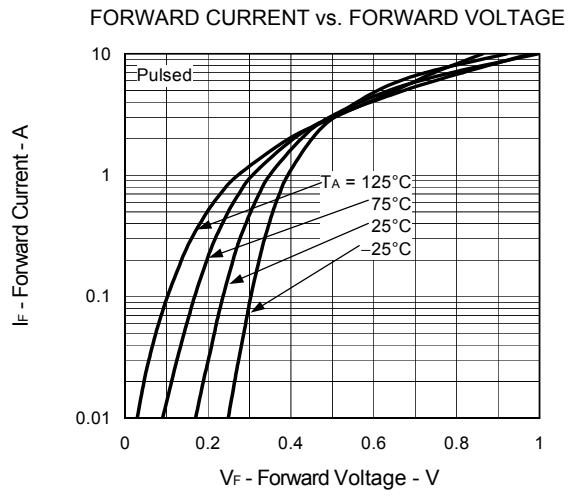
DYNAMIC INPUT CHARACTERISTICS



SOURCE TO DRAIN DIODE FORWARD VOLTAGE



SCHOTTKY BARRIER DIODE TYPICAL CHARACTERISTICS ($T_A = 25^\circ\text{C}$)



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