

To our customers,

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## Old Company Name in Catalogs and Other Documents

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Renesas Electronics website: <http://www.renesas.com>

April 1<sup>st</sup>, 2010  
Renesas Electronics Corporation

Issued by: Renesas Electronics Corporation (<http://www.renesas.com>)

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# MOS FIELD EFFECT TRANSISTOR 2SJ687

## SWITCHING P-CHANNEL POWER MOSFET

### DESCRIPTION

The 2SJ687 is P-channel MOSFET device and a excellent switch that can be driven by a low power-supply voltage.

### FEATURES

- Low on-state resistance  
 $R_{DS(on)1} = 7.0 \text{ m}\Omega \text{ MAX. (} V_{GS} = -4.5 \text{ V, } I_D = -10 \text{ A)}$   
 $R_{DS(on)2} = 9.0 \text{ m}\Omega \text{ MAX. (} V_{GS} = -3.0 \text{ V, } I_D = -10 \text{ A)}$   
 $R_{DS(on)3} = 20 \text{ m}\Omega \text{ MAX. (} V_{GS} = -2.5 \text{ V, } I_D = -10 \text{ A)}$
- 2.5 V drive available
- Avalanche capability ratings

### ORDERING INFORMATION

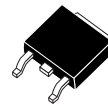
PART NUMBER	LEAD PLATING	PACKING	PACKAGE
2SJ687-ZK-E1-AY <sup>Note</sup>	Pure Sn (Tin)	Tape 2500 p/reel	TO-252 (MP-3ZK) 0.27 g TYP.
2SJ687-ZK-E2-AY <sup>Note</sup>			

**Note** Pb-free (This product does not contain Pb in external electrode.)

### ABSOLUTE MAXIMUM RATINGS (T<sub>A</sub> = 25°C)

Drain to Source Voltage (V <sub>GS</sub> = 0 V)	V <sub>DSS</sub>	-20	V
Gate to Source Voltage (V <sub>DS</sub> = 0 V)	V <sub>GSS</sub>	±12	V
Drain Current (DC) (T <sub>C</sub> = 25°C)	I <sub>D(DC)</sub>	±20	A
Drain Current (pulse) <sup>Note1</sup>	I <sub>D(pulse)</sub>	±60	A
Total Power Dissipation (T <sub>C</sub> = 25°C)	P <sub>T1</sub>	36	W
Total Power Dissipation (T <sub>A</sub> = 25°C)	P <sub>T2</sub>	1.0	W
Channel Temperature	T <sub>ch</sub>	150	°C
Storage Temperature	T <sub>stg</sub>	-55 to +150	°C
Single Avalanche Current <sup>Note2</sup>	I <sub>AS</sub>	-20	A
Single Avalanche Energy <sup>Note2</sup>	E <sub>AS</sub>	40	mJ

(TO-252)



**Notes 1.** PW ≤ 10 μs, Duty Cycle ≤ 1%

**2.** Starting T<sub>ch</sub> = 25°C, V<sub>DD</sub> = -10 V, R<sub>G</sub> = 25 Ω, V<sub>GS</sub> = -12 → 0 V

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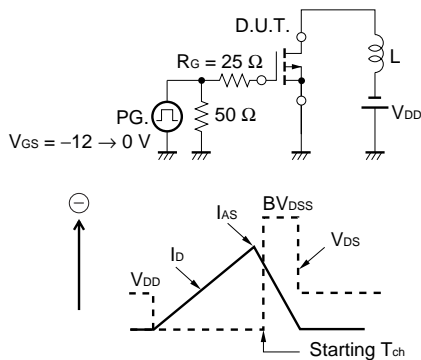
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**ELECTRICAL CHARACTERISTICS (T<sub>A</sub> = 25°C)**

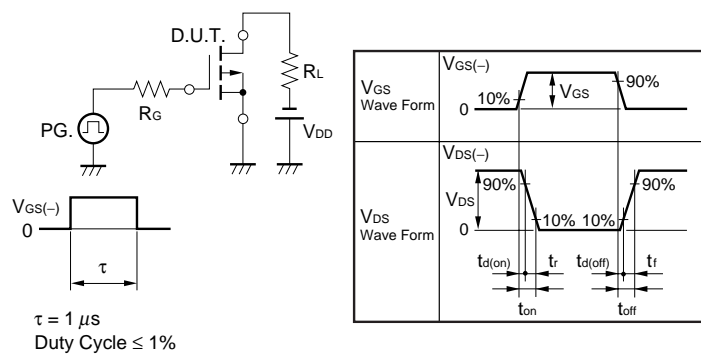
CHARACTERISTICS	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNIT
Zero Gate Voltage Drain Current	I <sub>DSS</sub>	V <sub>DS</sub> = -20 V, V <sub>GS</sub> = 0 V			-10	μA
<R> Gate Leakage Current	I <sub>GSS</sub>	V <sub>GS</sub> = ±12 V, V <sub>DS</sub> = 0 V			±100	nA
<R> Gate to Source Cut-off Voltage	V <sub>GS(off)</sub>	V <sub>DS</sub> = -10 V, I <sub>D</sub> = -1 mA	-0.6	-1.2	-1.45	V
Forward Transfer Admittance <sup>Note</sup>	y <sub>fs</sub>	V <sub>DS</sub> = -10 V, I <sub>D</sub> = -10 A	20			S
Drain to Source On-state Resistance <sup>Note</sup>	R <sub>DS(on)1</sub>	V <sub>GS</sub> = -4.5 V, I <sub>D</sub> = -10 A		5.4	7.0	mΩ
	R <sub>DS(on)2</sub>	V <sub>GS</sub> = -3.0 V, I <sub>D</sub> = -10 A		7.1	9.0	mΩ
	R <sub>DS(on)3</sub>	V <sub>GS</sub> = -2.5 V, I <sub>D</sub> = -10 A		10.8	20	mΩ
Input Capacitance	C <sub>iss</sub>	V <sub>DS</sub> = -10 V,		4400		pF
Output Capacitance	C <sub>oss</sub>	V <sub>GS</sub> = 0 V,		1070		pF
Reverse Transfer Capacitance	C <sub>rss</sub>	f = 1 MHz		760		pF
Turn-on Delay Time	t <sub>d(on)</sub>	V <sub>DD</sub> = -10 V, I <sub>D</sub> = -10 A,		36		ns
Rise Time	t <sub>r</sub>	V <sub>GS</sub> = -4.5 V,		220		ns
Turn-off Delay Time	t <sub>d(off)</sub>	R <sub>G</sub> = 3 Ω		270		ns
Fall Time	t <sub>f</sub>			310		ns
Total Gate Charge	Q <sub>G</sub>	V <sub>DD</sub> = -16 V,		57		nC
Gate to Source Charge	Q <sub>GS</sub>	V <sub>GS</sub> = -4.5 V,		12		nC
Gate to Drain Charge	Q <sub>GD</sub>	I <sub>D</sub> = -20 A		28		nC
Body Diode Forward Voltage <sup>Note</sup>	V <sub>F(S-D)</sub>	I <sub>F</sub> = -20 A, V <sub>GS</sub> = 0 V		0.85	1.5	V
Reverse Recovery Time	t <sub>rr</sub>	I <sub>F</sub> = -20 A, V <sub>GS</sub> = 0 V,		200		ns
Reverse Recovery Charge	Q <sub>rr</sub>	di/dt = -100 A/μs		240		nC

**Note** Pulsed

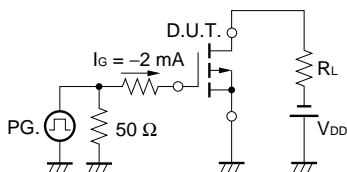
**TEST CIRCUIT 1 AVALANCHE CAPABILITY**



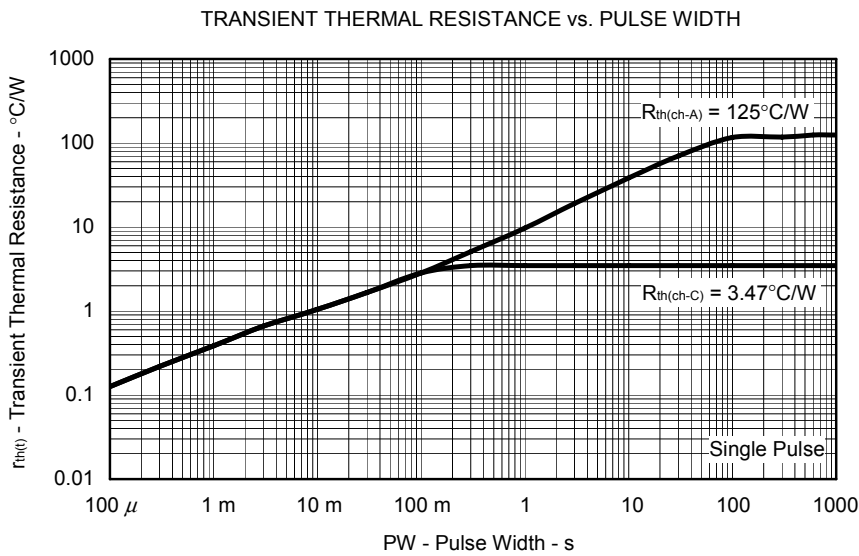
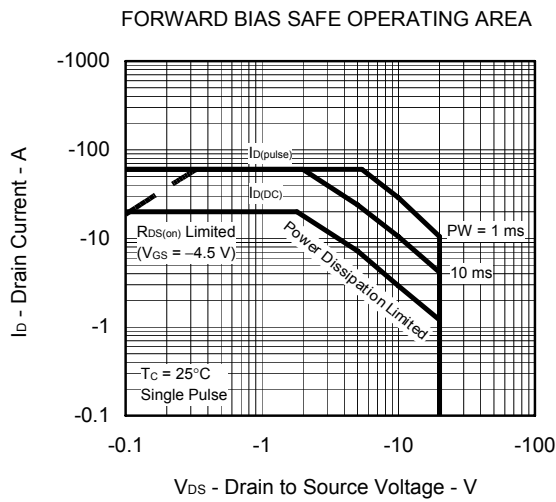
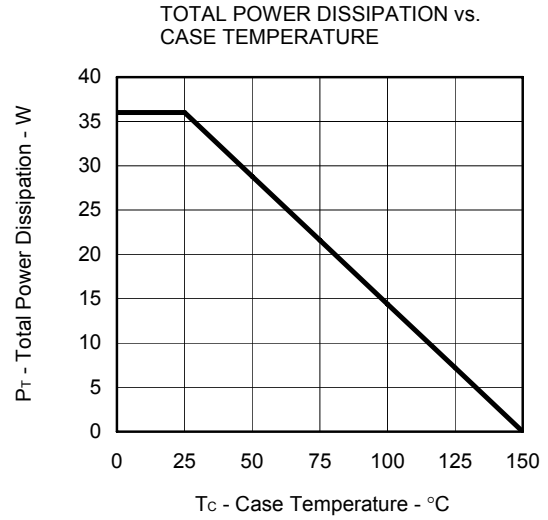
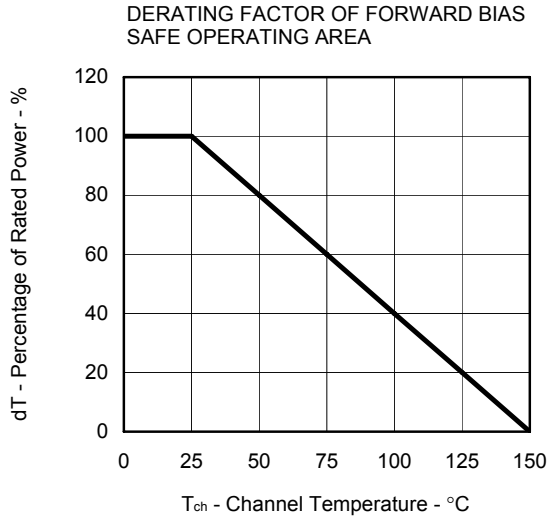
**TEST CIRCUIT 2 SWITCHING TIME**

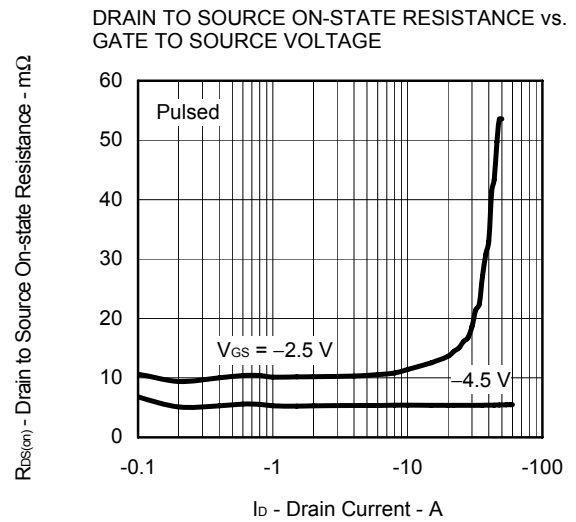
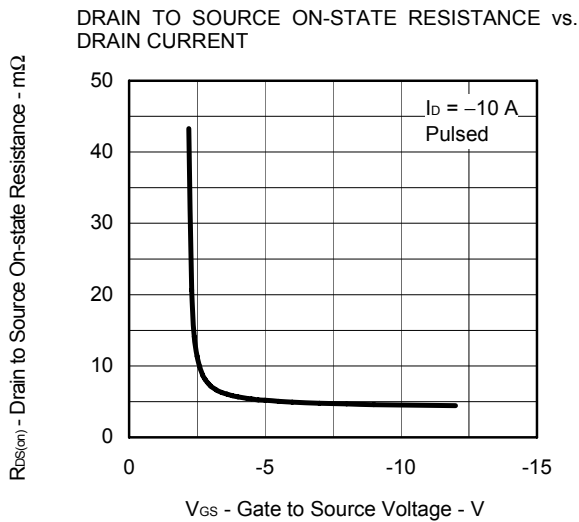
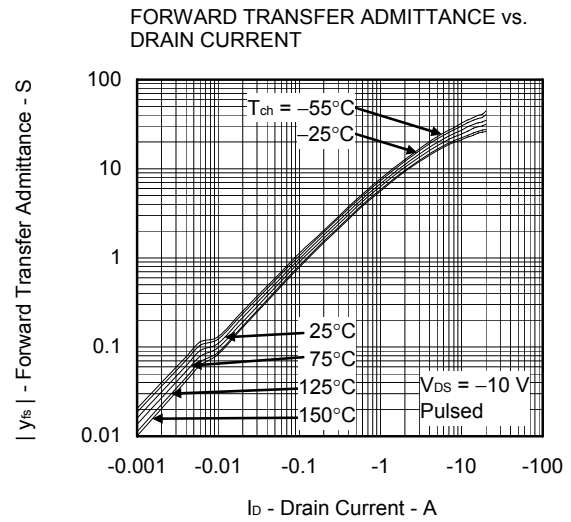
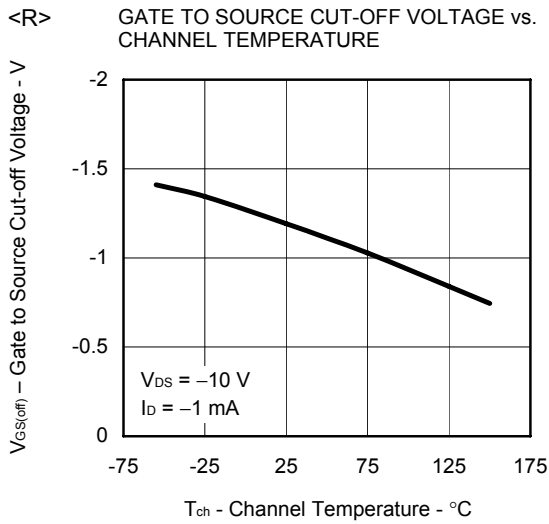
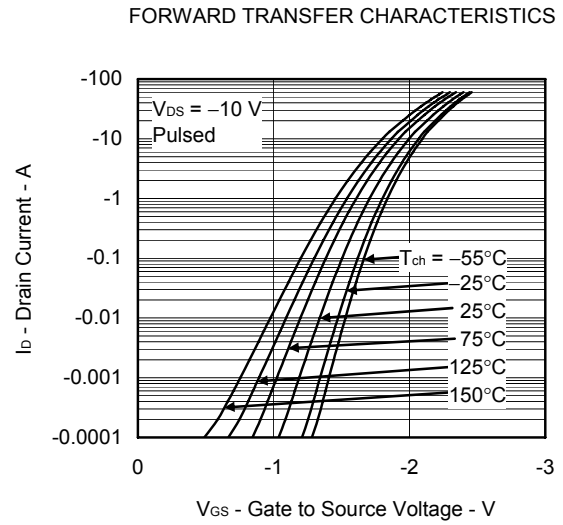
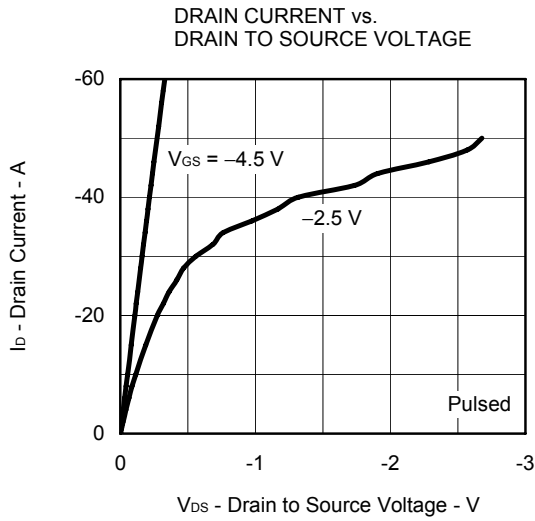


**TEST CIRCUIT 3 GATE CHARGE**

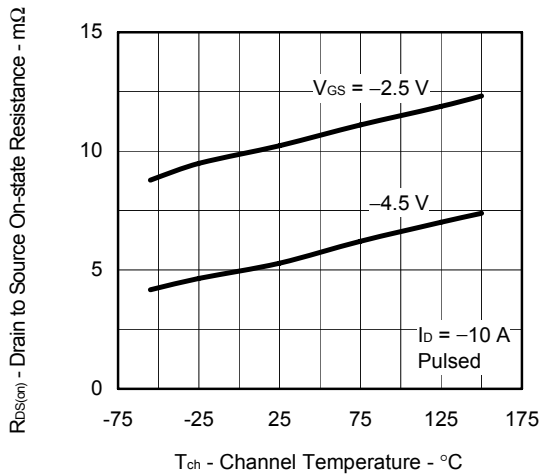


TYPICAL CHARACTERISTICS (T<sub>A</sub> = 25°C)

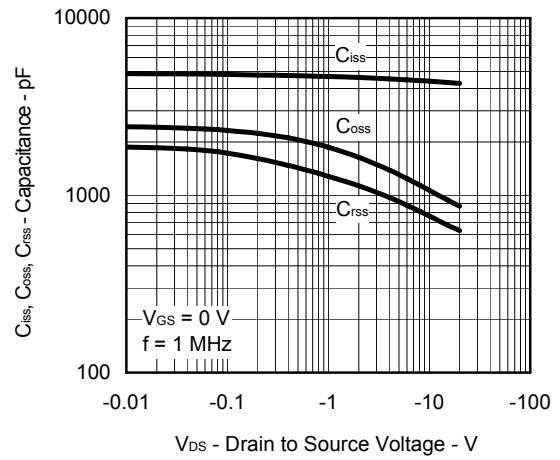




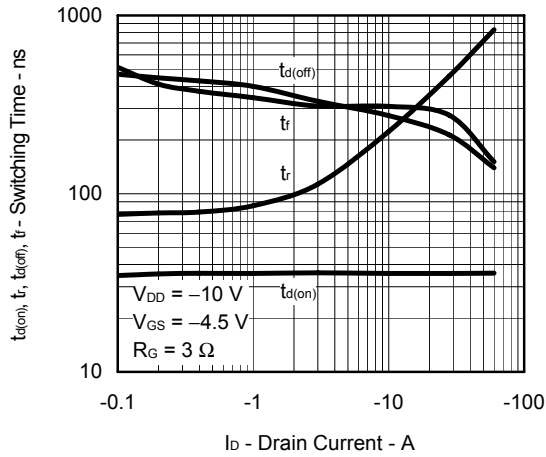
DRAIN TO SOURCE ON-STATE RESISTANCE vs. CHANNEL TEMPERATURE



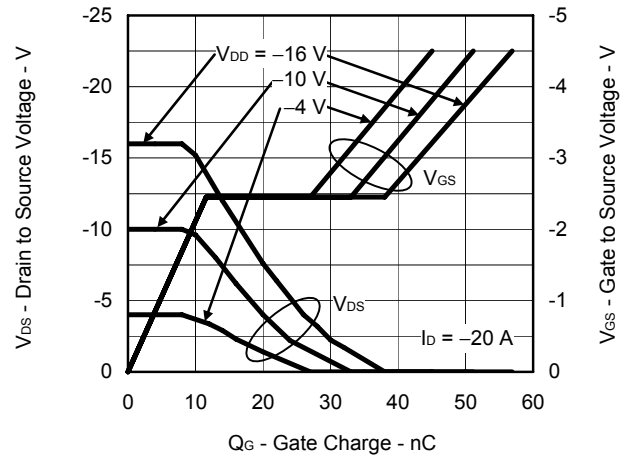
CAPACITANCE vs. DRAIN TO SOURCE VOLTAGE



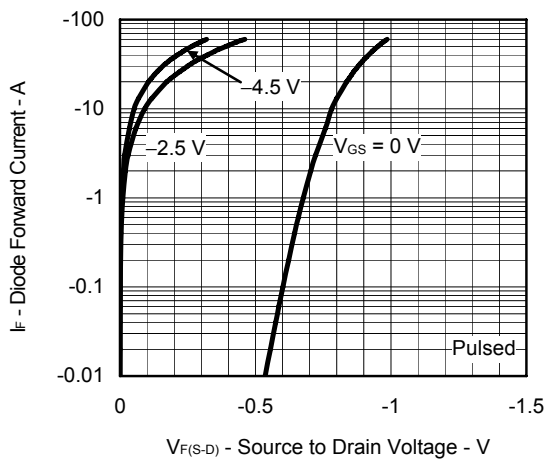
SWITCHING CHARACTERISTICS



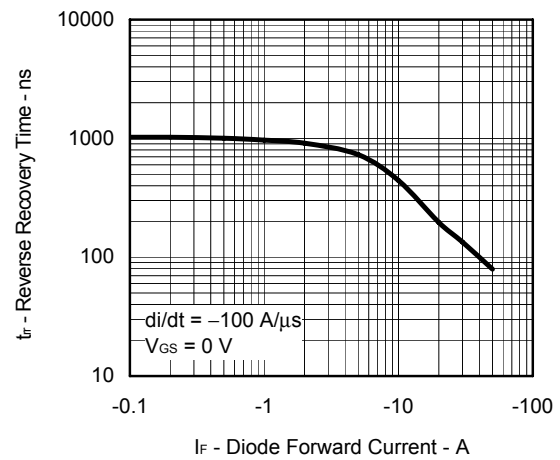
DYNAMIC INPUT/OUTPUT CHARACTERISTICS

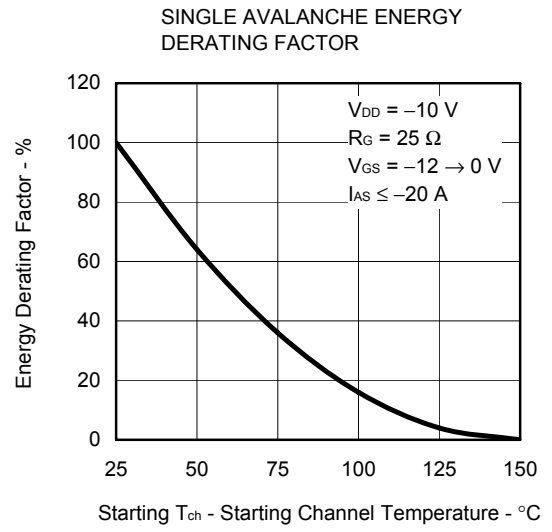
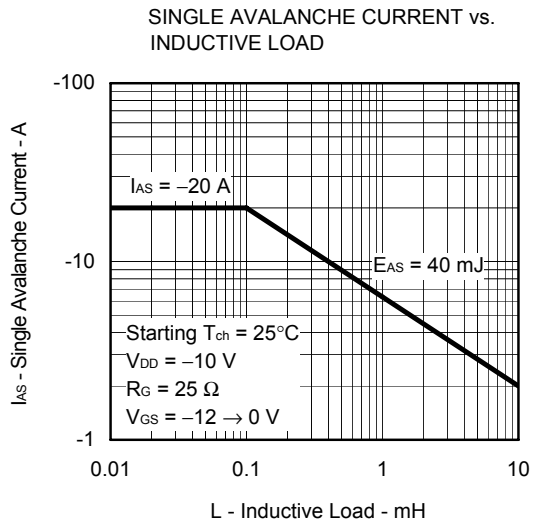


SOURCE TO DRAIN DIODE FORWARD VOLTAGE



REVERSE RECOVERY TIME vs. DIODE FORWARD CURRENT









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