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

April 1st, 2010
Renesas Electronics Corporation

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

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RENESAS

DATA SHEET

N-CHANNEL MOS FIELD EFFECT POWER TRANSISTORS

2SK1493,2SK1493-Z/2SK1494,2SK1494-Z

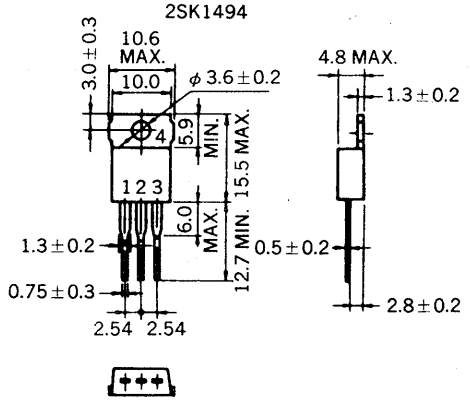
SWITCHING N-CHANNEL POWER MOS FET INDUSTRIAL USE

Phase-out/Discontinued

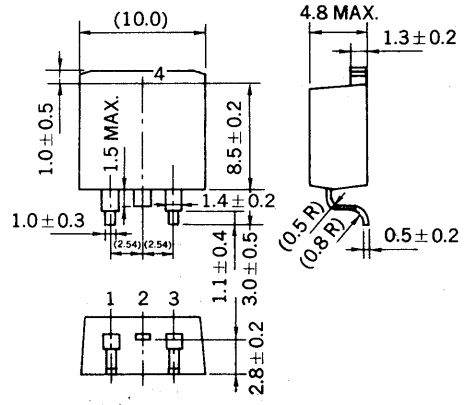
PACKAGE DIMENSIONS

(Unit: mm)

2SK1493
2SK1494

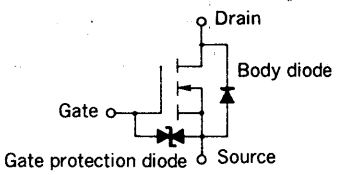


2SK1493-Z
2SK1494-Z



PIN CONNECTIONS

1. Gate
2. Drain
3. Source
4. Fin (Drain)



DESCRIPTION

The 2SK1495/2SK1496 is N-channel MOS Field Effect Transistor designed for high voltage switching applications.

FEATURES

- Low On-state Resistance
  $R_{DS(on)}$ = 2.8 Ω MAX./3.0 Ω MAX. (V_{GS} = 10 V, I_D = 3 A)
- Low C_{iss} C_{iss} = 350 pF TYP.
- Built-in G-S Gate Protection Diodes
- High Avalanche Capability Ratings

ABSOLUTE MAXIMUM RATINGS

Maximum Temperatures			
Storage Temperature	T_{stg}	−55 to +150	°C
Channel Temperature	T_c	150	°C MAX.
Maximum power Dissipation			
Total Power Dissipation (T_A = 25 °C)	P_T	50	W
Maximum Voltages and Currents (T_A = 25 °C)			
Drain to Source Voltage	V_{DSS}	450/500 (2SK1493/2SK1494)	V
Gate to Source Voltage	V_{GSS}	±30	V
Drain Current (DC)	$I_{D(DC)}$	±3	A
Drain Current (pulse)	$I_{D(pulse)}$*	±12	A

* PW ≦ 10 μs, Duty Cycle ≦ 1 %

Maximum Avalanche Capability Ratings**			
Single Avalanche Current	I_{AS}	4.5	A
Single Avalanche Energy	E_{AS}	57	mJ

** Starting T_{ch} = 25 °C, R_G = 25 Ω, V_{GS} = 20 V → 0

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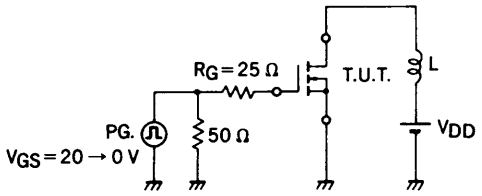
Date Published October 1997 M
Printed in Japan

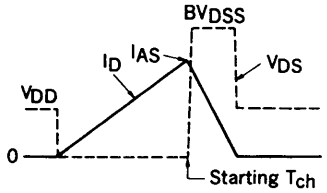
Phase-out/Discontinued

ELECTRICAL CHARACTERISTICS (T_A = 25 °C)

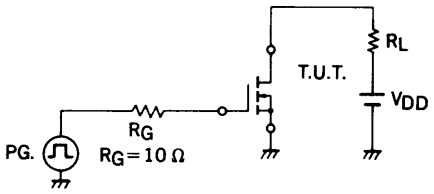
CHARACTERISTICS	SYMBOL	MIN.	TYP.	MAX.	UNIT	TEST CONDITIONS
Drain to Source On-state Resistance	$R_{DS(on)}$		2.2	2.8	Ω	V_{GS} = 10 V, I_D = 2 A
(2SK1493/2SK1494)			2.4	3.0	Ω	
Gate to Source Cutoff Voltage	$V_{GS(off)}$	2.5		3.5	V	V_{DS} = 10 V, I_D = 1 mA
Forward Transfer Admittance	$\|y_{fs}\|$	1.0			S	V_{DS} = 10 V, I_D = 2 A
Drain Leackage Current	I_{DSS}			100	μA	V_{DS} = 450 V/500 V, V_{GS} = 0
Gate to Source Leakage Current	I_{GSS}			±10	μA	V_{GS} = ±30 V, V_{DS} = 0
Input Capacitance	C_{iss}		350		pF	V_{DS} = 10 V, V_{GS} = 0, f = 1 MHz
Output Capacitance	C_{oss}		120		pF	
Reverse Transfer Capacitance	C_{rss}		45		pF	
Turn-On Delay Time	$t_{d(on)}$		5		ns	V_{GS} = 10 V, V_{DD} = 150 V, I_D = 2 A, R_G = 10 Ω, R_L = 75 Ω
Rise Time	t_r		10		ns	
Turn-Off Delay Time	$t_{d(off)}$		30		ns	
Fall Time	t_f		15		ns	
Total Gate Charge	Q_G		12		nC	V_{GS} = 10 V, I_D = 3 A, V_{DD} = 400 V
Gate to Source Charge	Q_{GS}		3		nC	
Gate to Drain Charge	Q_{GD}		7		nC	
Diode Forward Voltage	$V_{F(S-D)}$		1.0		V	I_F = 3 A, V_{GS} = 0
Reverse Recovery Time	t_{rr}		310		ns	I_F = 3 A, di/dt = 50 A/μs
Reverse Recovery Charge	Q_{rr}		1.2		μC	

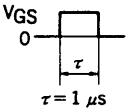
Test Circuit 1: Avalanche Capability

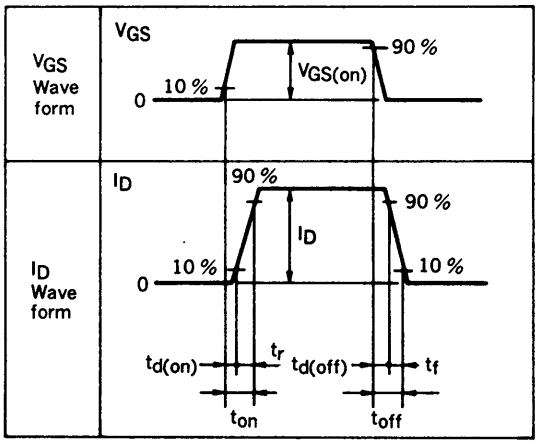




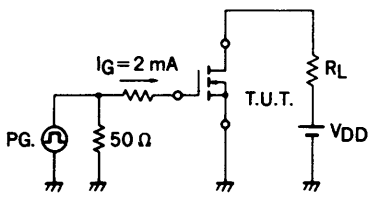
Test Circuit 2: Switching Time







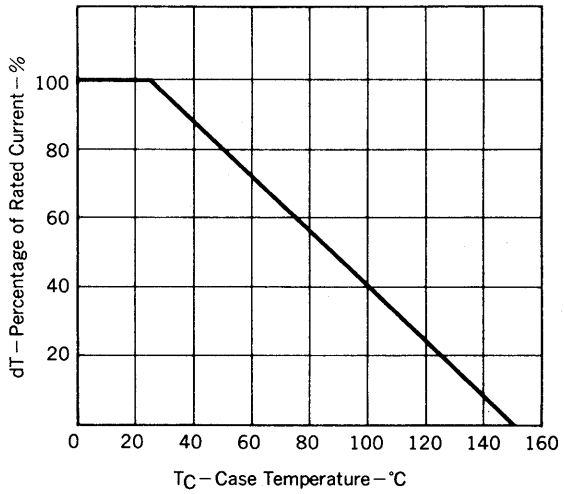
Test Circuit 3: Gate Charge



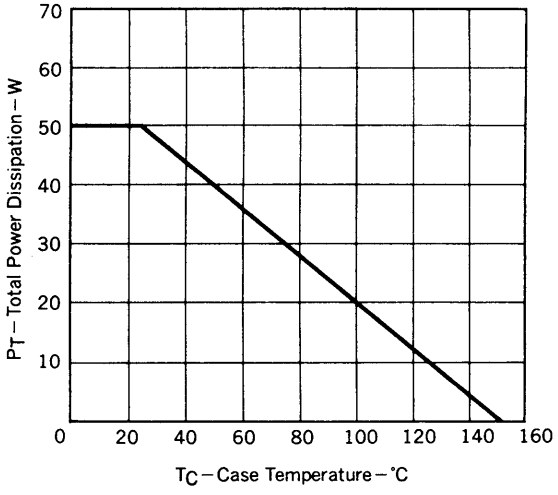
Phase-out/Discontinued

TYPICAL CHARACTERISTICS (T_A = 25 °C)

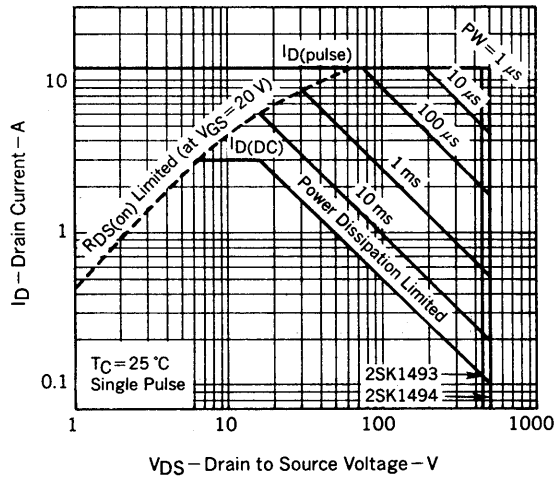
DERATING FACTOR OF FORWARD BIAS SAFE OPERATING AREA



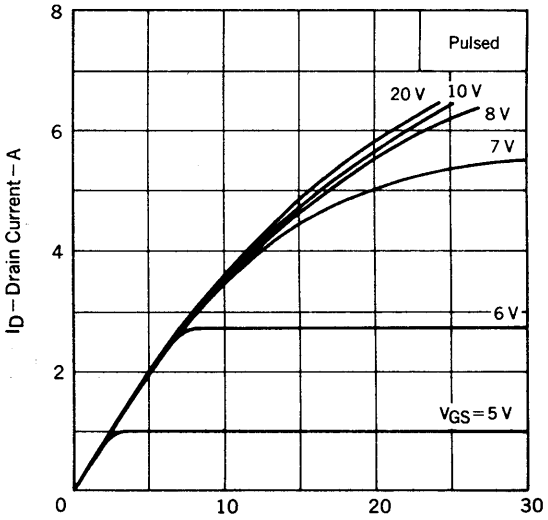
TOTAL POWER DISSIPATION vs. CASE TEMPERATURE



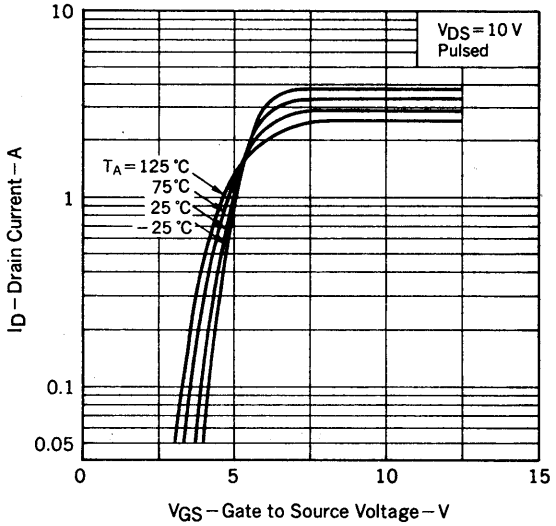
FORWARD BIAS SAFE OPERATING AREA



DRAIN CURRENT vs. DRAIN TO SOURCE VOLTAGE

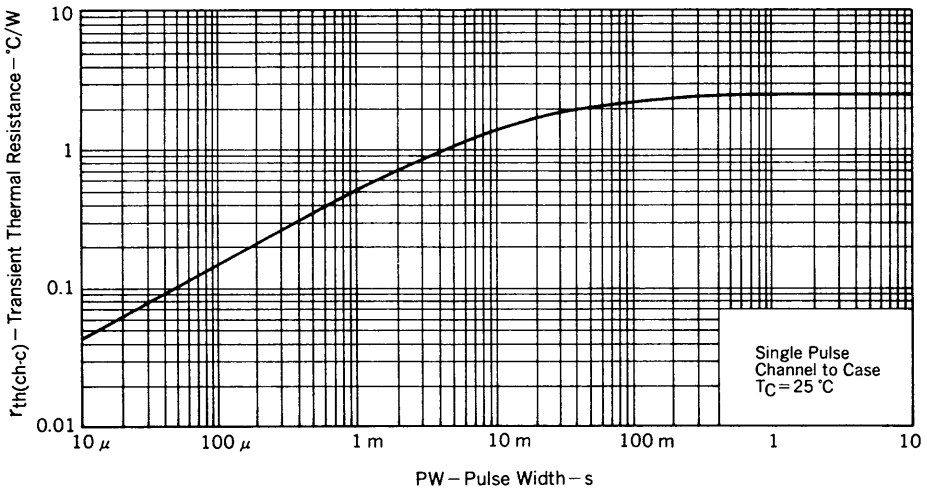


TRANSFER CHARACTERISTICS

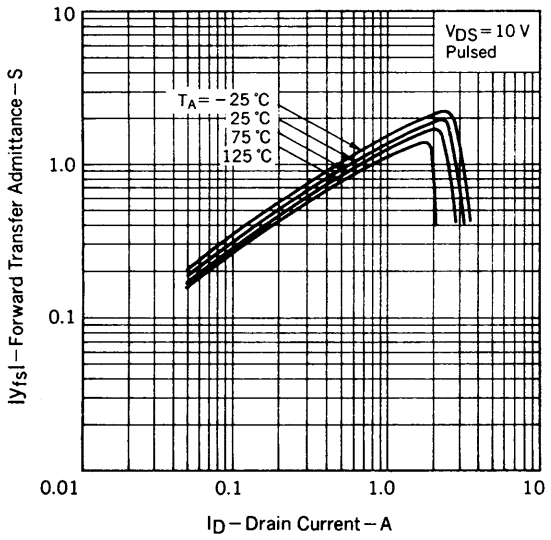


Phase-out/Discontinued

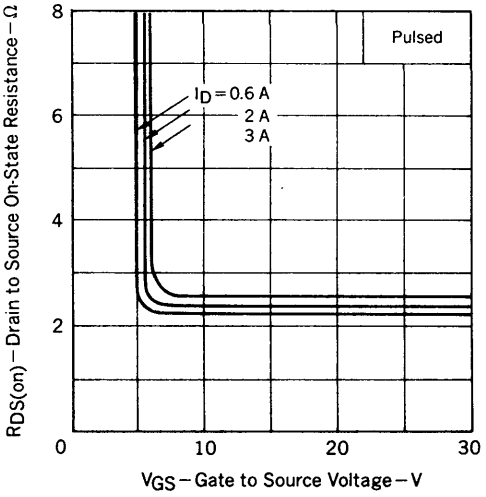
TRANSIENT THERMAL RESISTANCE vs. PULSE WIDTH



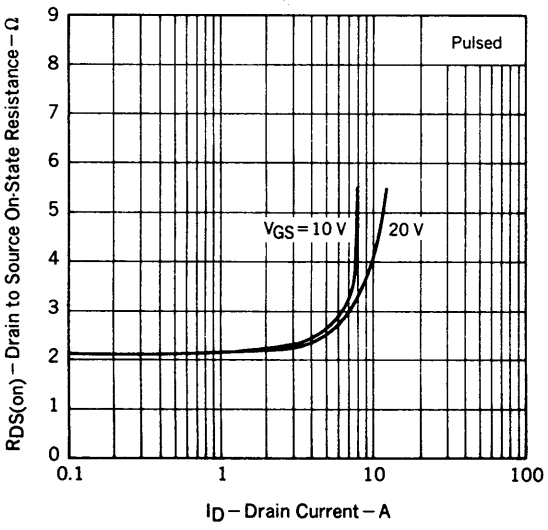
FORWARD TRANSFER ADMITTANCE vs. DRAIN CURRENT



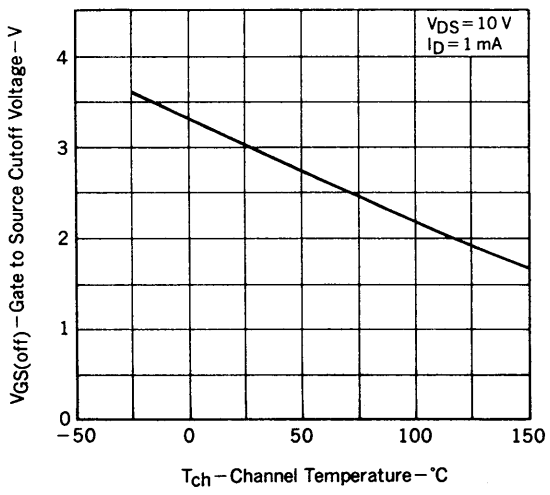
DRAIN TO SOURCE ON-STATE RESISTANCE vs. GATE TO SOURCE VOLTAGE



DRAIN TO SOURCE ON-STATE RESISTANCE vs. DRAIN CURRENT

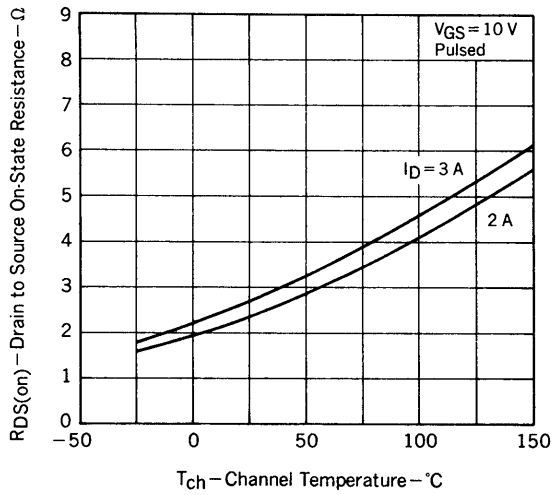


GATE TO SOURCE CUTOFF VOLTAGE vs. CHANNEL TEMPERATURE

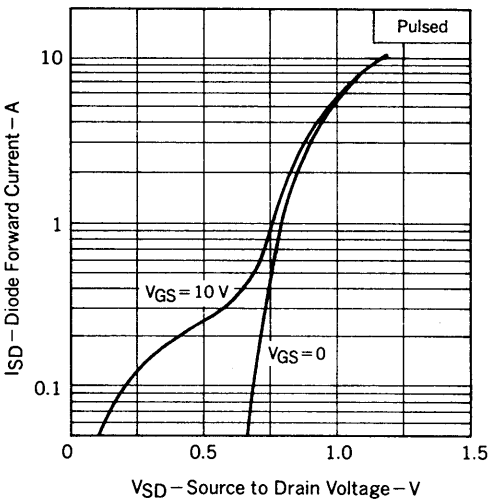


Phase-out/Discontinued

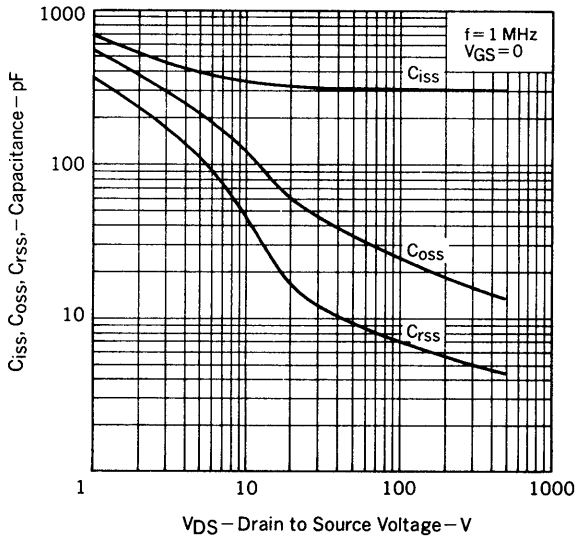
DRAIN TO SOURCE ON-STATE RESISTANCE vs. CHANNEL TEMPERATURE



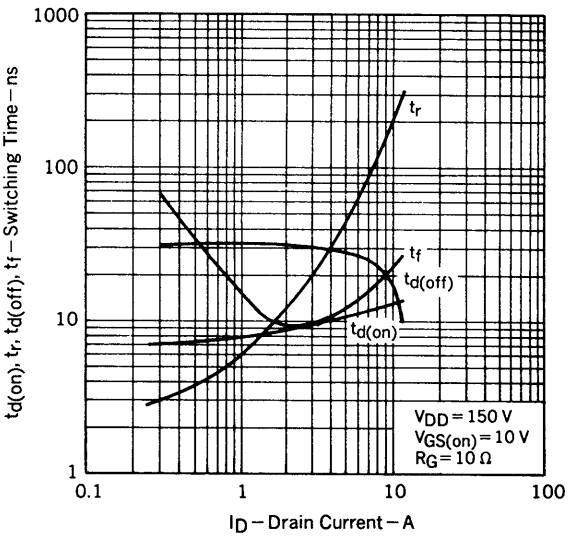
SOURCE TO DRAIN DIODE FORWARD VOLTAGE



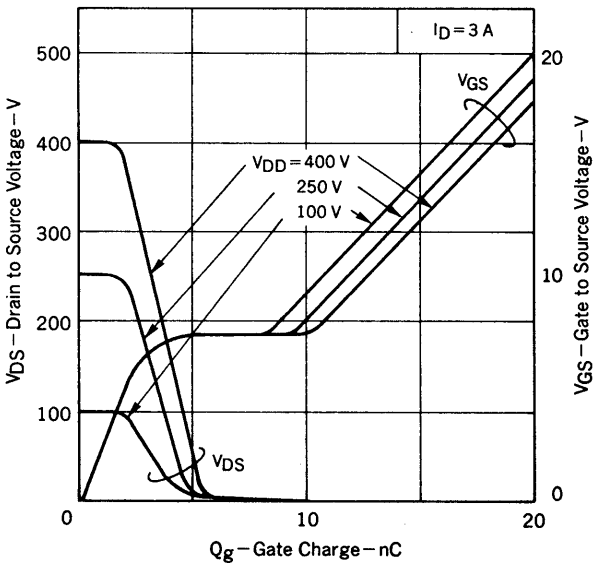
CAPACITANCE vs. DRAIN TO SOURCE VOLTAGE



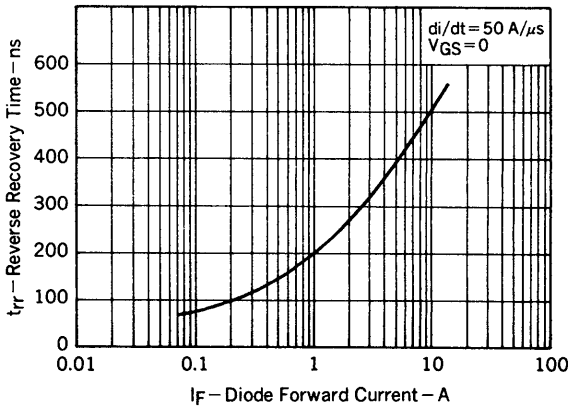
SWITCHING CHARACTERISTICS



DYNAMIC INPUT CHARACTERISTICS

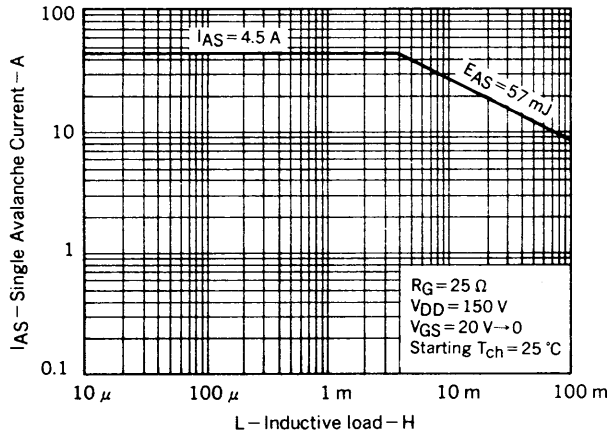


REVERSE RECOVERY TIME vs. DIODE FORWARD CURRENT

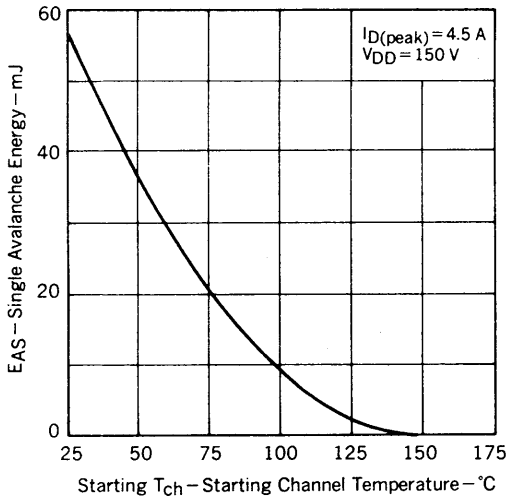


Phase-out/Discontinued

SINGLE AVALANCHE CURRENT vs.
INDUCTIVE LOAD



SINGLE AVALANCHE ENERGY vs.
STARTING CHANNEL TEMPERATURE



REFERENCE

Application note name	No.
Guide to quality assurance for semiconductor device	MEI-1202
Power MOS FET features and application switching power supply	TEA-1034
Application circuits using Power MOS FET	TEA-1035
Safe operating area of Power MOS FET	TEA-1037

Phase-out/Discontinued

[MEMO]

M4 96.5