NEC

MOS FIELD EFFECT TRANSISTOR
2SK2414, 2414-Z

SWITCHING
N-CHANNEL POWER MOS FET

DESCRIPTION

The 2SK2414 is N-Channel MOS Field Effect Transistor designed for high voltage switching applications.

FEATURES

- Low On-Resistance
  $R_{DS(on)1}$ = 70 mΩ MAX. (V_{GS} = 10 V, I_D = 5.0 A)
  $R_{DS(on)2}$ = 95 mΩ MAX. (V_{GS} = 4 V, I_D = 5.0 A)
- <R> Low C_{iss}: C_{iss} = 860 pF TYP.
- Built-in G-S Gate Protection Diodes
- High Avalanche Capability Ratings

ABSOLUTE MAXIMUM RATINGS (T_A = 25 °C)

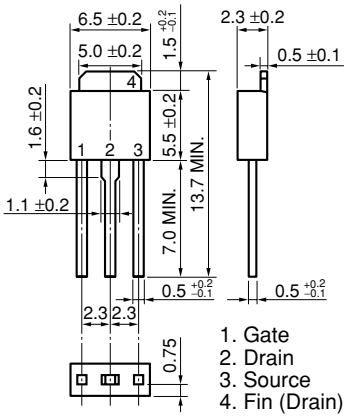
Drain to Source Voltage	V_{DSS}	60	V
Gate to Source Voltage	V_{GSS}	±20	V
Drain Current (DC)	$I_{D(DC)}$	±10	A
Drain Current (pulse) **Note 1**	$I_{D(pulse)}$	±40	A
Total Power Dissipation (T_C = 25 °C)	P_{T1}	20	W
Total Power Dissipation (T_A = 25 °C)	P_{T2}	1.0	W
Channel Temperature	T_{ch}	150	°C
Storage Temperature	T_{stg}	–55 to +150	°C
Single Avalanche Current **Note 2**	I_{AS}	10	A
Single Avalanche Energy **Note 2**	E_{AS}	10	mJ

Notes 1 PW ≤ 10 μs, Duty Cycle ≤ 1 %

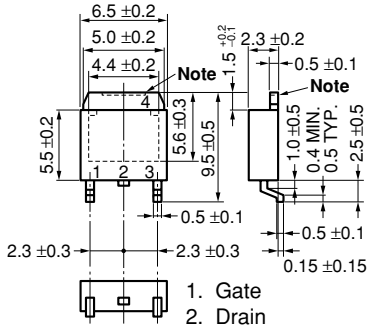
2 Starting T_{ch} = 25 °C, R_G = 25 Ω, V_{GS} = 20 → 0 V

<R> **PACKAGE DIMENSIONS**

(Unit: mm)



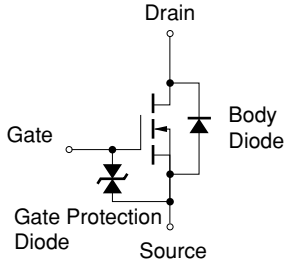
MP-3



Note The depth of notch at the top of the fin is from 0 to 0.2 mm.

MP-3Z (SURFACE MOUNT TYPE)

EQUIVALENT CIRCUIT



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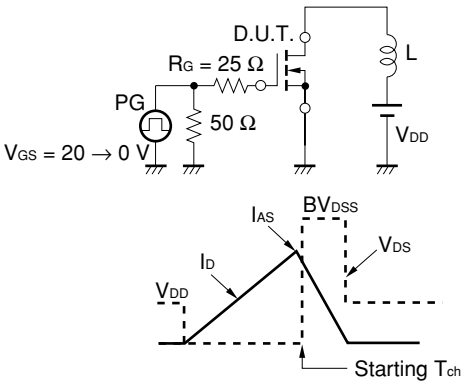
The mark <R> shows major revised points.

The revised points can be easily searched by copying an "<R>" in the PDF file and specifying it in the "Find what." field.

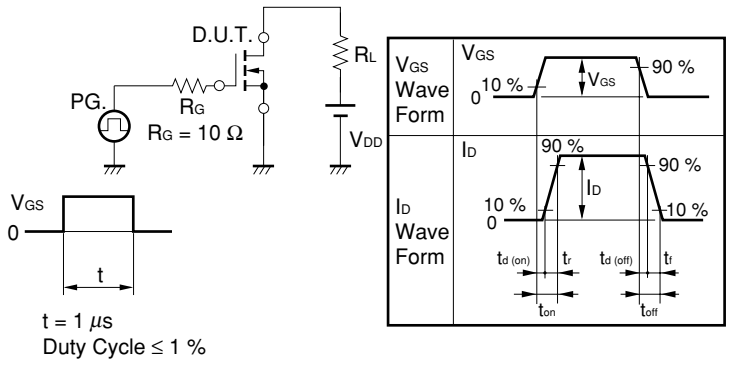
ELECTRICAL CHARACTERISTICS (T_A = 25 °C)

CHARACTERISTIC	SYMBOL	MIN.	TYP.	MAX.	UNIT	TEST CONDITIONS
Drain to Source On-Resistance	$R_{DS(on)1}$		52	70	mΩ	V_{GS} = 10 V, I_D = 5.0 A
Drain to Source On-Resistance	$R_{DS(on)2}$		68	95	mΩ	V_{GS} = 4 V, I_D = 5.0 A
Gate to Source Cutoff Voltage	$V_{GS(off)}$	1.0	1.6	2.0	V	V_{DS} = 10 V, I_D = 1 mA
Forward Transfer Admittance	$\|y_{fs}\|$	7.0	12		S	V_{DS} = 10 V, I_D = 5.0 A
Drain Leakage Current	I_{DSS}			10	μA	V_{DS} = 60 V, V_{GS} = 0 V
Gate to Source Leakage Current	I_{GSS}			±10	μA	V_{GS} = ±20 V, V_{DS} = 0 V
Input Capacitance	C_{iss}		860		pF	V_{DS} = 10 V
Output Capacitance	C_{oss}		440		pF	V_{GS} = 0 V
Reverse Transfer Capacitance	C_{rss}		110		pF	f = 1 MHz
Turn-On Delay Time	$t_{d(on)}$		15		ns	I_D = 5.0 A
Rise Time	t_r		90		ns	V_{GS} = 10 V
Turn-Off Delay Time	$t_{d(off)}$		75		ns	V_{DD} = 30 V
Fall Time	t_f		35		ns	R_G = 10 Ω
Total Gate Charge	Q_G		24		nC	I_D = 10 A
Gate to Source Charge	Q_{GS}		2.6		nC	V_{DD} = 48 V
Gate to Drain Charge	Q_{GD}		6.0		nC	V_{GS} = 10 V
Body Diode Forward Voltage	$V_{F(S-D)}$		1.0		V	I_F = 10 A, V_{GS} = 0 V
Reverse Recovery Time	t_{rr}		85		ns	I_F = 10 A, V_{GS} = 0 V
Reverse Recovery Charge	Q_{rr}		220		nC	di/dt = 50 A/μs

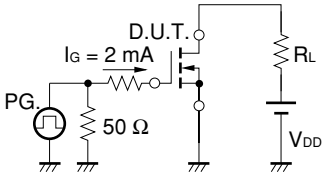
Test Circuit 1 Avalanche Capability



Test Circuit 2 Switching Time

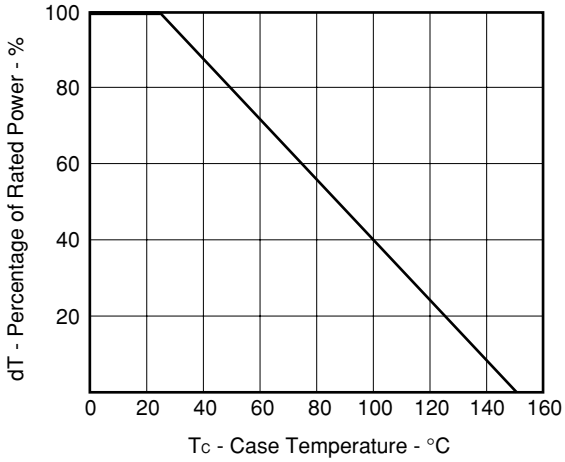


Test Circuit 3 Gate Charge

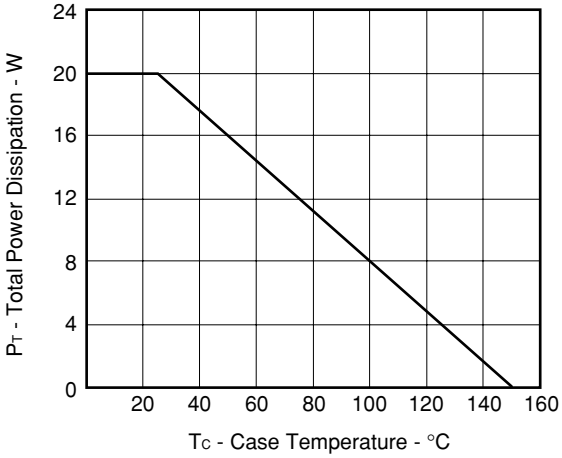


TYPICAL CHARACTERISTICS (T_A = 25 °C)

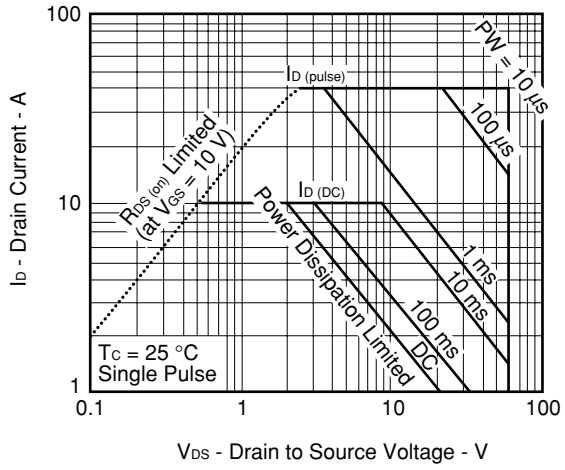
DERATING FACTOR OF FORWARD BIAS SAFE OPERATING AREA



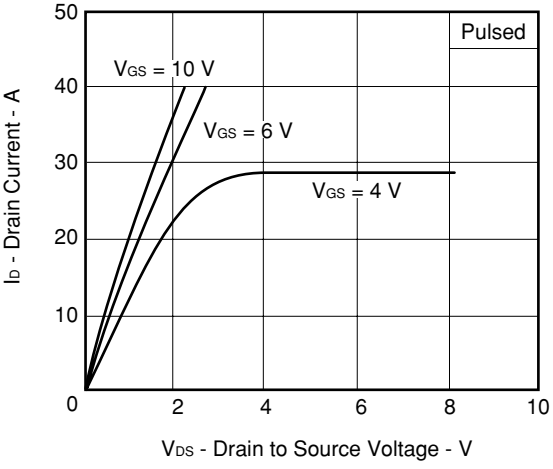
TOTAL POWER DISSIPATION vs. CASE TEMPERATURE



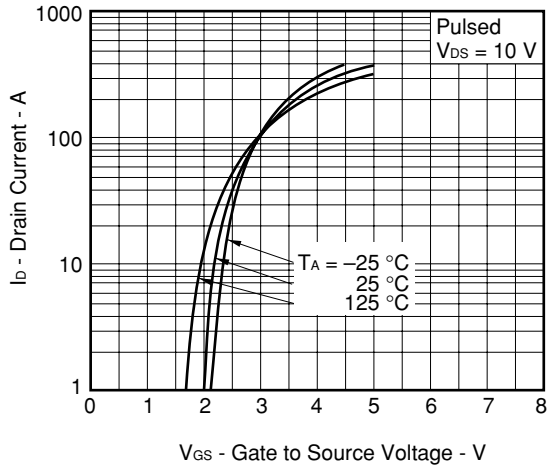
FORWARD BIAS SAFE OPERATING AREA



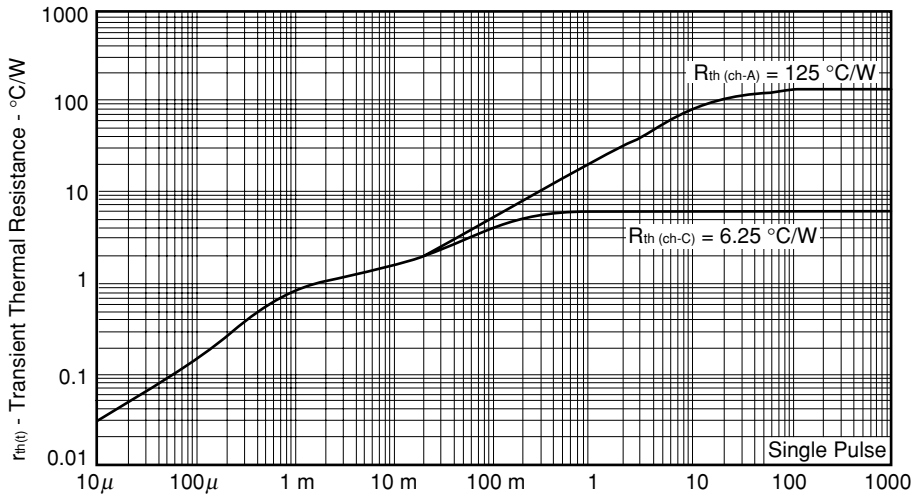
DRAIN CURRENT vs. DRAIN TO SOURCE VOLTAGE



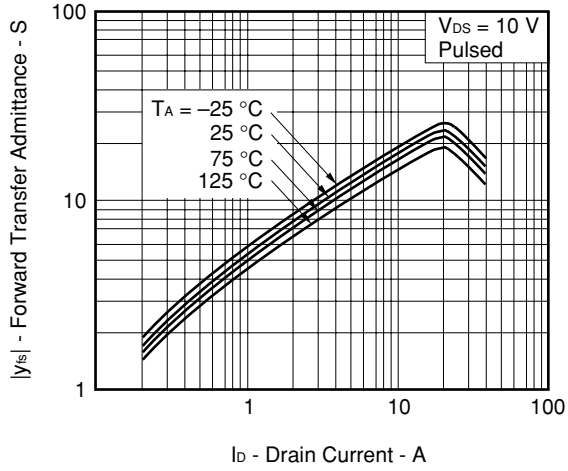
FORWARD TRANSFER CHARACTERISTICS



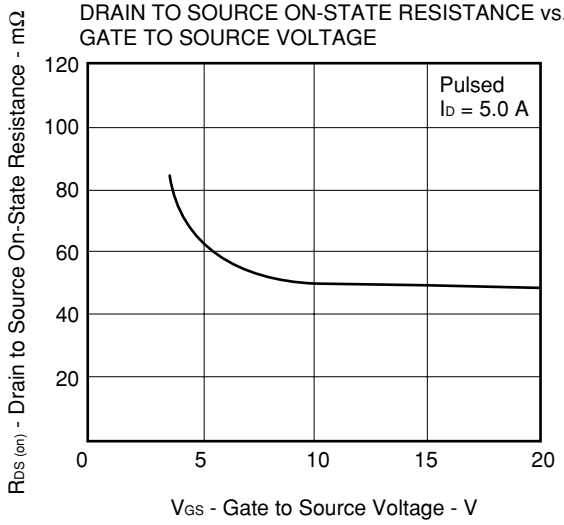
TRANSIENT THERMAL RESISTANCE vs. PULSE WIDTH



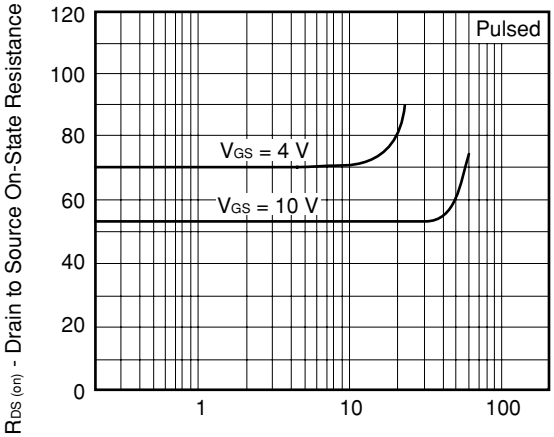
FORWARD TRANSFER ADMITTANCE vs. DRAIN CURRENT



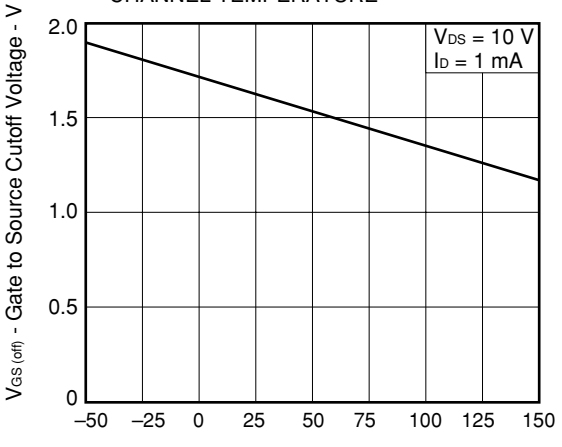
DRAIN TO SOURCE ON-STATE RESISTANCE vs. GATE TO SOURCE VOLTAGE



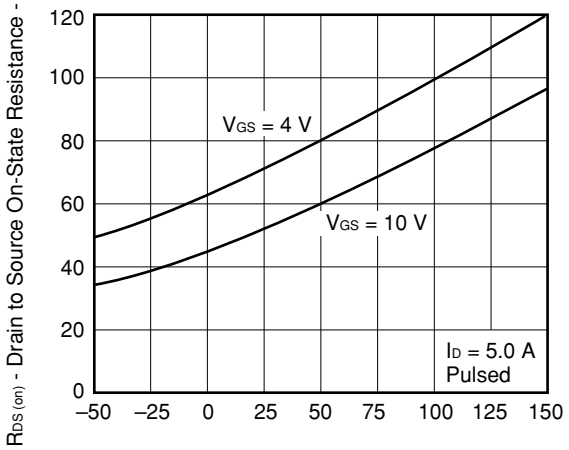
DRAIN TO SOURCE ON-STATE RESISTANCE vs. DRAIN CURRENT



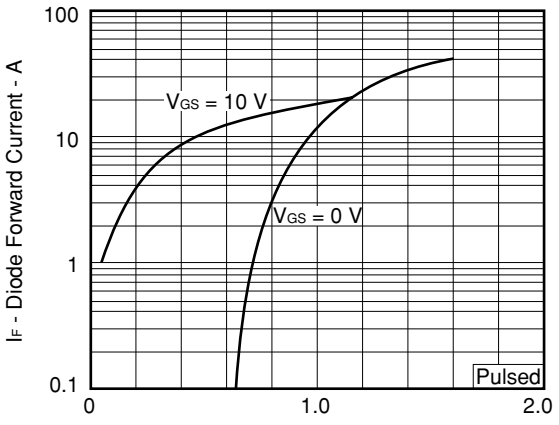
GATE TO SOURCE CUTOFF VOLTAGE vs. CHANNEL TEMPERATURE



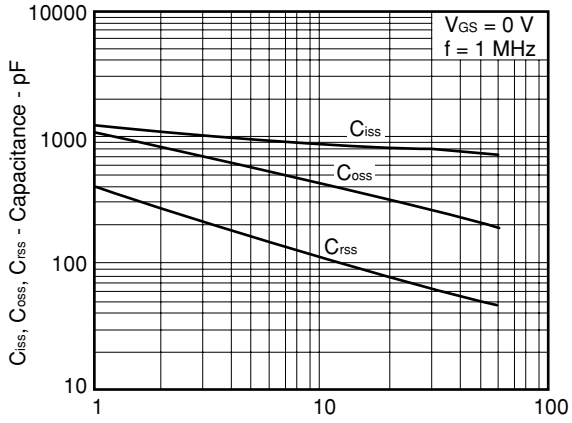
DRAIN TO SOURCE ON-STATE RESISTANCE vs. CHANNEL TEMPERATURE



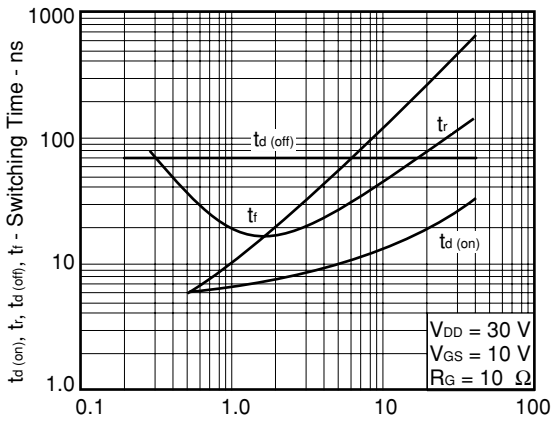
SOURCE TO DRAIN DIODE FORWARD VOLTAGE



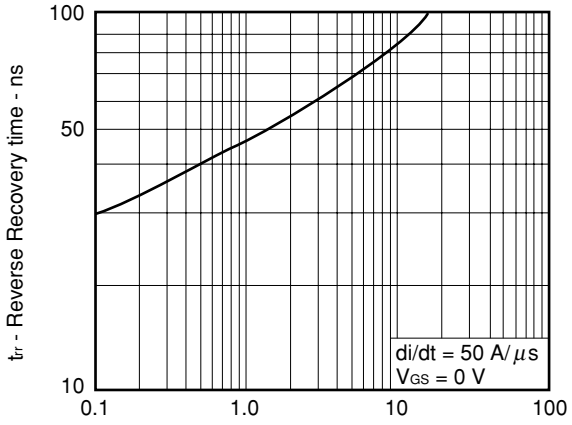
CAPACITANCE vs. DRAIN TO SOURCE VOLTAGE



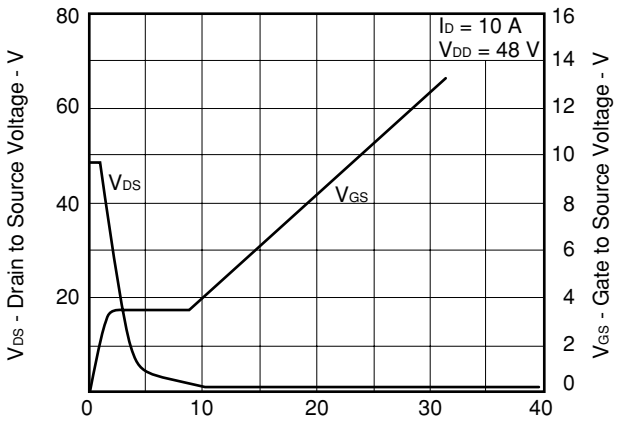
SWITCHING CHARACTERISTICS



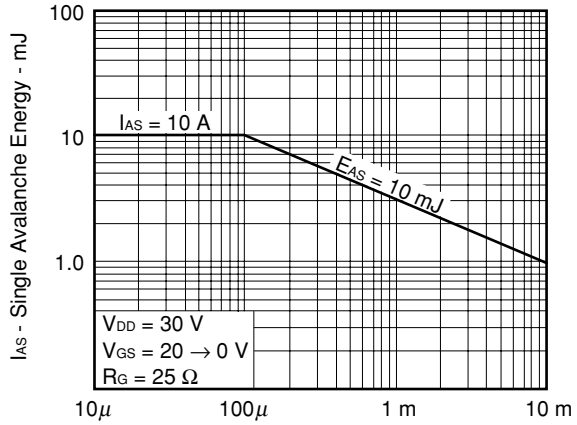
REVERSE RECOVERY TIME vs. DRAIN CURRENT



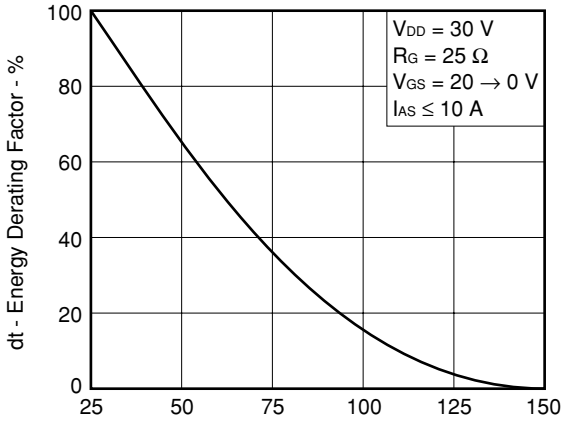
DYNAMIC INPUT/OUTPUT CHARACTERISTICS



SINGLE AVALANCHE ENERGY vs.
INDUCTIVE LOAD



SINGLE AVALANCHE ENERGY
DERATING FACTOR



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