NEC

MOS FIELD EFFECT POWER TRANSISTORS
2SK1748, 1748-Z

SWITCHING
N-CHANNEL POWER MOS FET
INDUSTRIAL USE

DESCRIPTION

The 2SK1748 is N-channel MOS Field Effect Transistor designed for solenoid, motor and lamp driver.

FEATURES

- Low On-state Resistance
  $R_{DS(on)}$ = 0.11 Ω (V_{GS} = 10 V, I_D = 4 A)
  $R_{DS(on)}$ = 0.16 Ω (V_{GS} = 4 V, I_D = 4 A)
- Low C_{iss} C_{iss} = 850 pF TYP.
- Built-in G-S Gate Protection Diode

QUALITY GRADE

Standard

Please refer to "Quality grade on NEC Semi-conductor Devices" (Document number IEI-1209) published by NEC Corporation to know the specification of quality grade on the devices and its recommended applications.

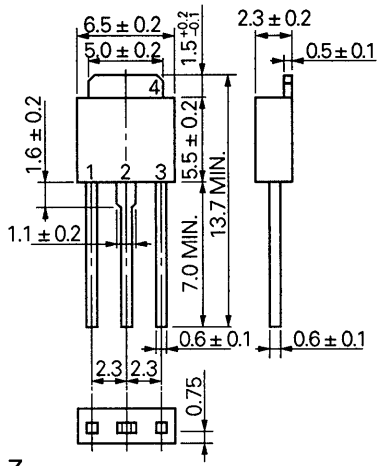
ABSOLUTE MAXIMUM RATINGS (T_a = 25 °C)

Drain to Source Voltage	V_{DSS}	60	V
Gate to Source Voltage	V_{GSS}	±20	V
Drain Current (DC)	$I_{D(DC)}$	±8.0	A
Drain Current (pulse)	$I_{D(pulse)}$*	±24	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

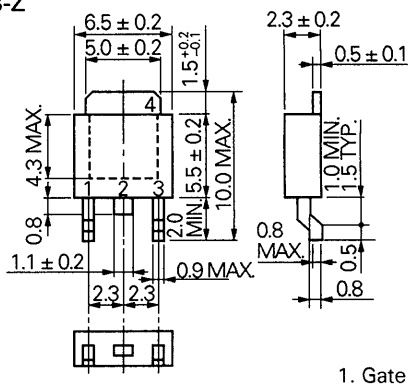
* PW ≦ 10 μs, Duty Cycle ≦ 1 %

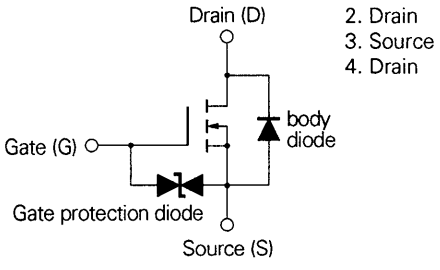
PACKAGE DIMENSIONS
in millimeters

2SK1748



2SK1748-Z





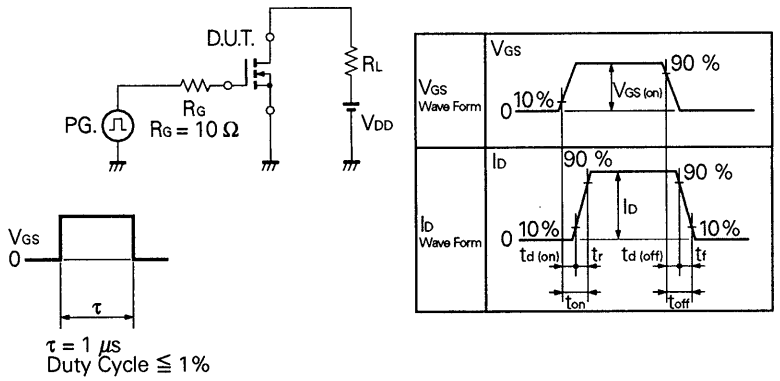
1. Gate
2. Drain
3. Source
4. Drain

Document No. TC-2424
Date Published August 1993 M
Printed in Japan

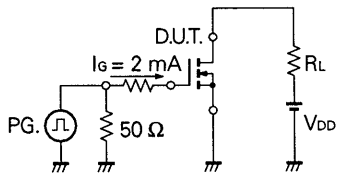
ELECTRICAL CHARACTERISTICS (T_a = 25 °C)

CHARACTERISTIC	SYMBOL	MIN.	TYP.	MAX.	UNIT	TEST CONDITIONS
Drain to Source On-state Resistance	$R_{DS(on)}$		0.08	0.11	Ω	V_{GS} = 10 V, I_D = 4 A
Drain to Source On-state Resistance	$R_{DS(on)}$		0.11	0.16	Ω	V_{GS} = 4 V, I_D = 4 A
Gate to Source Cutoff Voltage	$V_{GS(off)}$	1.0		2.5	V	V_{DS} = 10 V, I_D = 1 mA
Forward Transfer Admittance	$\|y_{fs}\|$	5.0			S	V_{DS} = 10 V, I_D = 4 A
Drain Leakage Current	I_{DSS}			10	μA	V_{DS} = 60 V, V_{GS} = 0
Gate to Source Leakage Current	I_{GSS}			±10	μA	V_{GS} = ±20 V, V_{DS} = 0
Input Capacitance	C_{iss}		850		pF	V_{DS} = 10 V V_{GS} = 0 f = 1 MHz
Output Capacitance	C_{oss}		350		pF	
Reverse Transfer Capacitance	C_{rss}		100		pF	
Turn-On Delay Time	$t_{d(on)}$		15		ns	$V_{GS(on)}$ = 10 V V_{DD} = 30 V I_D = 4 A, R_G = 10 Ω R_L = 7.5 Ω
Rise Time	t_r		60		ns	
Turn-Off Delay Time	$t_{d(off)}$		100		ns	
Fall Time	t_f		45		ns	
Total Gate Charge	Q_G		3		nC	V_{GS} = 10 V I_D = 8 A V_{DD} = 48 V
Gate to Source Charge	Q_{GS}		7		nC	
Gate to Drain Charge	Q_{GD}		25		nC	
Reverse Recovery Time	t_{rr}		120		ns	I_F = 8 A, V_{GS} = 0 di/dt = 50 A/μs
Reverse Recovery Charge	Q_{rr}		200		nC	

Test Circuit 1: Switching Time

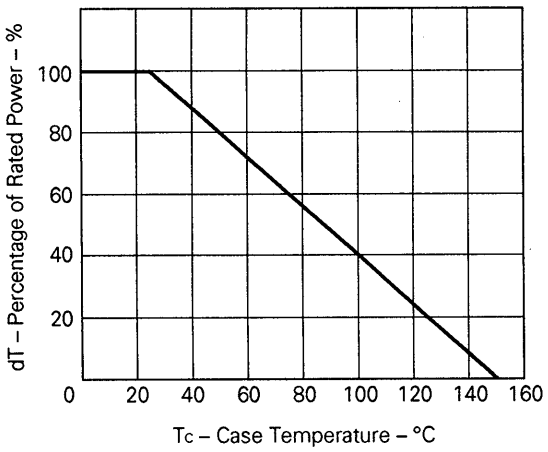


Test Circuit 2: Gate Charge

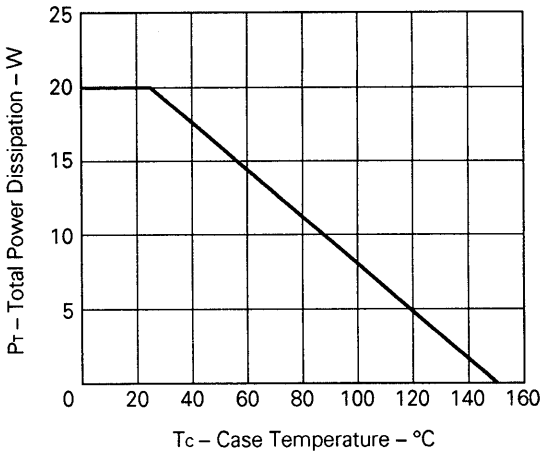


TYPICAL CHARACTERISTICS (T_a = 25 °C)

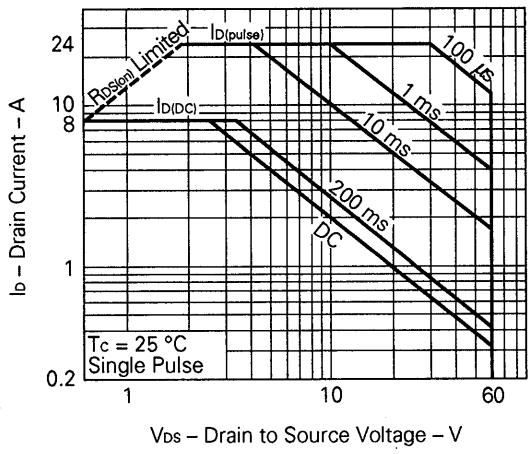
DERATING FACTOR OF FORWARD BIAS SAFE OPERATING AREA



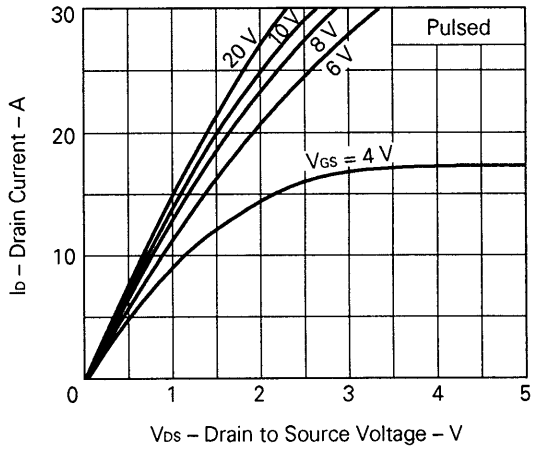
TOTAL POWER DISSIPATION vs. CASE TEMPERATURE



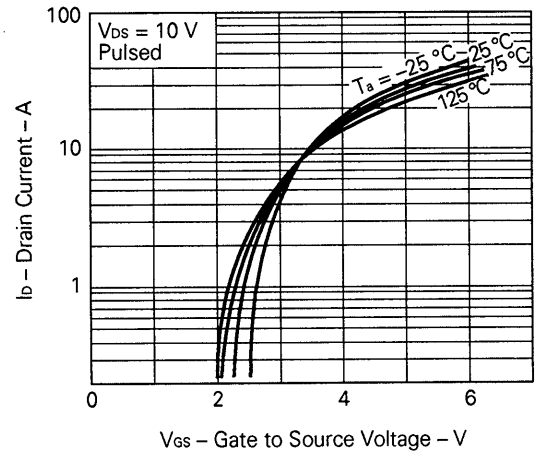
FORWARD BIAS OPERATING AREA



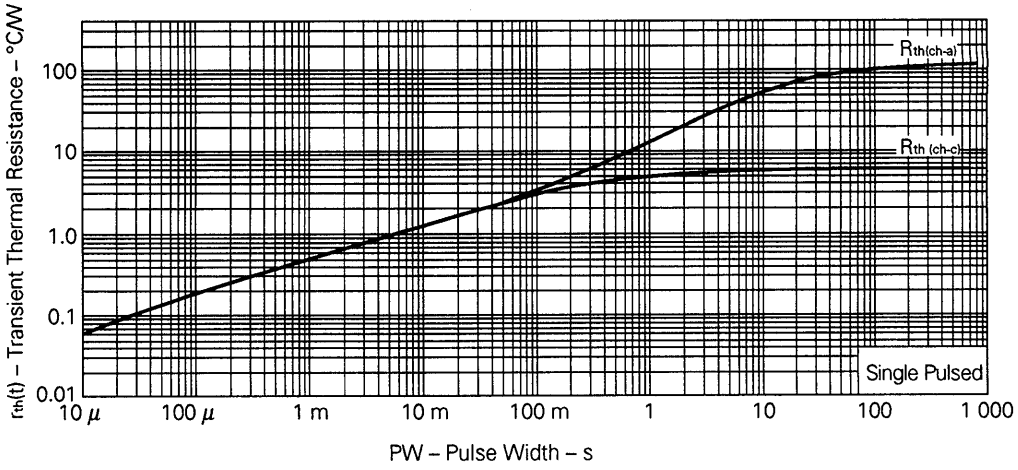
DRAIN CURRENT vs. DRAIN TO SOURCE VOLTAGE



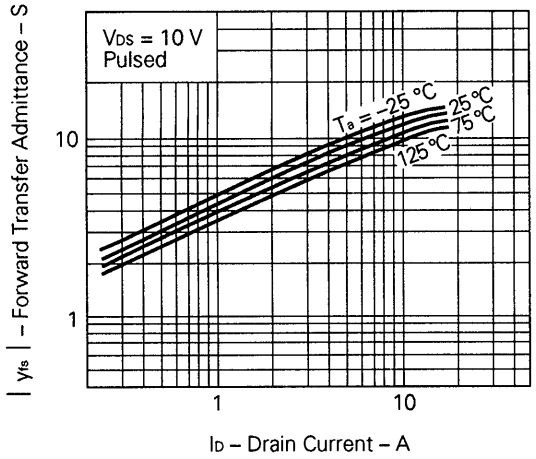
TRANSFER CHARACTERISTICS



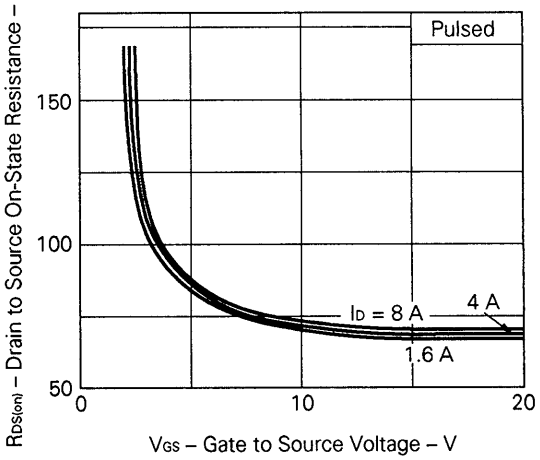
TRANSIENT THERMAL RESISTANCE vs. PULSE WIDTH



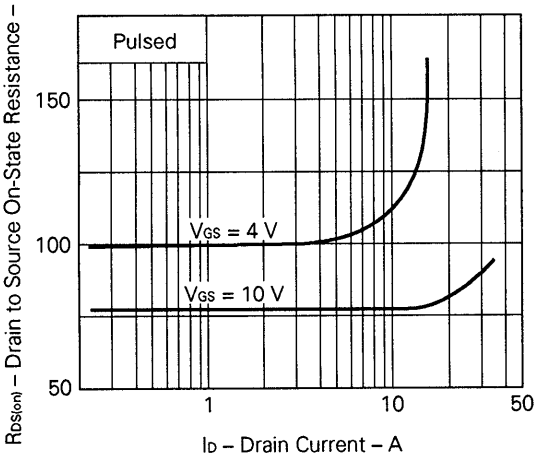
FORWARD TRANSFER ADMITTANCE vs. DRAIN CURRENT



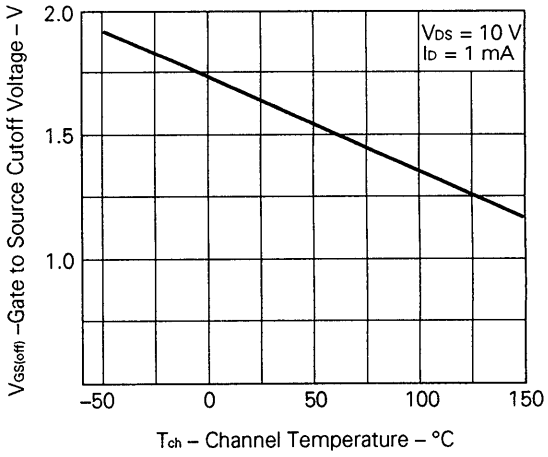
DRAIN TO SOURCE ON-STATE RESISTANCE vs. GATE TO SOURCE VOLTAGE



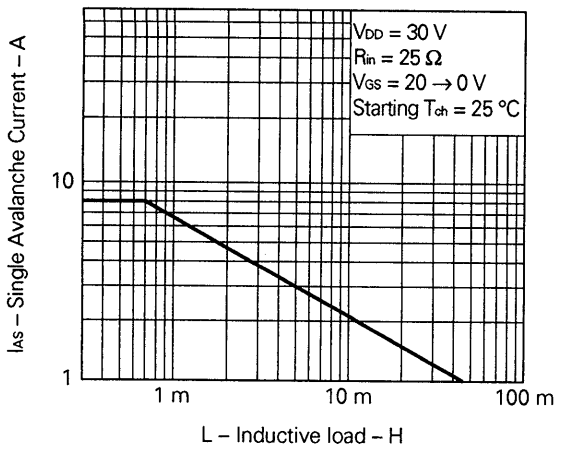
DRAIN TO SOURCE ON-STATE RESISTANCE vs. DRAIN CURRENT



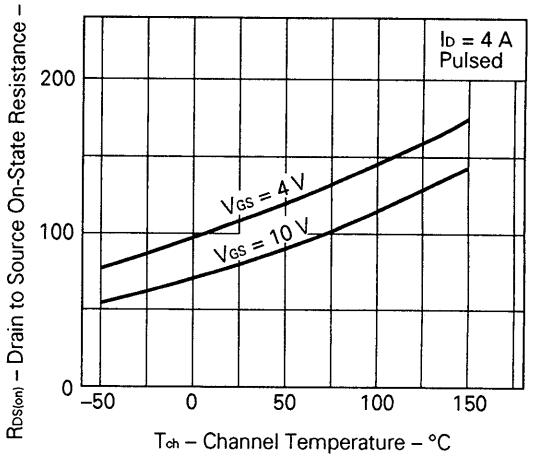
GATE TO SOURCE CUTOFF VOLTAGE vs. CHANNEL TEMPERATURE



SINGLE AVALANCHE CURRENT vs.
INDUCTIVE LOAD



DRAIN TO SOURCE ON-STATE RESISTANCE vs.
CHANNEL TEMPERATURE



Reference

Application note name	No.
Safe operating area of Power MOS FET.	TEA-1034
Application circuit using Power MOS FET.	TEA-1035
Quality control of NEC semiconductors devices.	TEI-1202
Quality control guide of semiconductors devices.	MEI-1202
Assembly manual of semiconductors devices.	IEI-1207

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