NEC

MOS FIELD EFFECT POWER TRANSISTORS

2SK2724

SWITCHING
N-CHANNEL POWER MOS FET
INDUSTRIAL USE

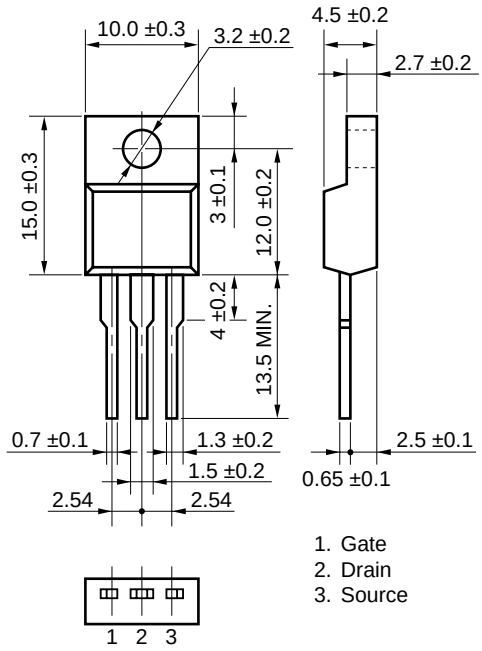
DESCRIPTION

This product is N-Channel MOS Field Effect Transistor designed for high current switching applications.

FEATURES

- Low On-Resistance
  $R_{DS(on)1}$ = 27 mΩ Max. (V_{GS} = 10 V, I_D = 18 A)
  $R_{DS(on)2}$ = 40 mΩ Max. (V_{GS} = 4 V, I_D = 18 A)
- Low C_{iss} C_{iss} =1 200 pF Typ.
- Built-in G-S Protection Diode
- Isolated TO-220 package

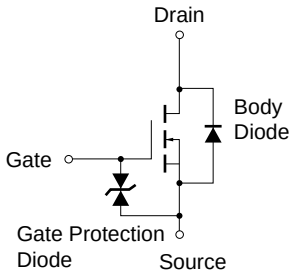
PACKAGE DIMENSIONS (in millimeter)



MP-45F (ISOLATED TO-220)

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)	$I_{D(DC)}$	±35	A
Drain Current (Pulse)*	$I_{D(pulse)}$	±140	A
Total Power Dissipation (T_A = 25 °C)	P_T	2.0	W
Total Power Dissipation (T_C = 25 °C)	P_T	30	W
Channel Temperature	T_{ch}	150	°C
Storage Temperature	T_{stg}	–55 to +150	°C



* PW ≤ 10 μs, duty cycle ≤ 1 %

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 voltage exceeding the rated voltage may be applied to this device.

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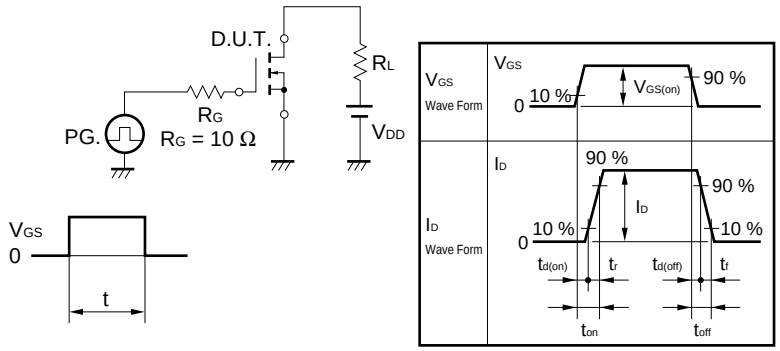
ELECTRICAL CHARACTERISTICS (T_A = 25 °C)

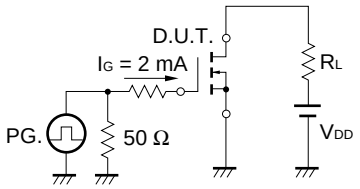
CHARACTERISTIC	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Drain to Source On-State Resistance	$R_{DS(on)1}$	V_{GS} = 10 V, I_D = 18 A		20	27	mΩ
	$R_{DS(on)2}$	V_{GS} = 4 V, I_D = 18 A		33	40	mΩ
Gate to Source Cutoff Voltage	$V_{GS(off)}$	V_{DS} = 10 V, I_D = 1 mA	1.0	1.5	2.0	V
Forward Transfer Admittance	$\|y_{fs}\|$	V_{DS} = 10 V, I_D = 18 A	10	23		S
Drain Leakage Current	I_{DSS}	V_{DS} = 60 V, V_{GS} = 0			10	μA
Gate to Source Leakage Current	I_{GSS}	V_{GS} = ±20 V, V_{DS} = 0			±10	μA
Input Capacitance	C_{iss}	V_{DS} = 10 V, V_{GS} = 0, f = 1 MHz		1 200		pF
Output Capacitance	C_{oss}			570		pF
Reverse Transfer Capacitance	C_{rss}			270		pF
Turn-On Delay Time	$t_{d(on)}$	I_D = 18 A, $V_{GS(on)}$ = 10 V, V_{DD} = 30 V, R_G = 10 Ω		35		ns
Rise Time	t_r			280		ns
Turn-Off Delay Time	$t_{d(off)}$			160		ns
Fall Time	t_f			170		ns
Total Gate Charge	Q_G	I_D = 35 A, V_{DD} = 48 V, V_{GS} = 10 V		50		nC
Gate to Source Charge	Q_{GS}			5.0		nC
Gate to Drain Charge	Q_{GD}			22		nC
Body Diode Forward Voltage	$V_{F(S-D)}$	I_F = 35 A, V_{GS} = 0		1.0		V
Reverse Recovery Time	t_{rr}	I_F = 35 A, V_{GS} = 0, di/dt = 100 A/μs		70		ns
Reverse Recovery Charge	Q_{rr}			130		nC

Test Circuit 1 Switching Time

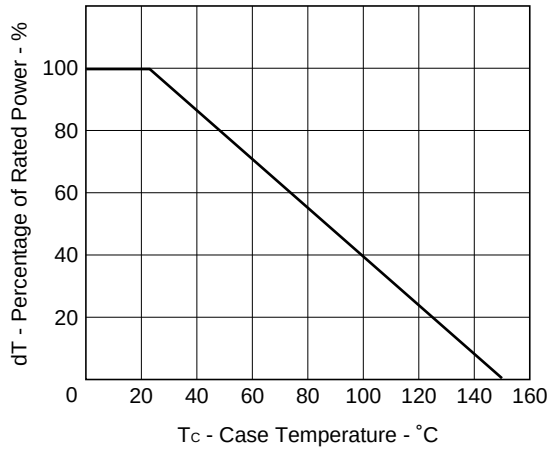


t = 1 μs
Duty Cycle ≤ 1 %

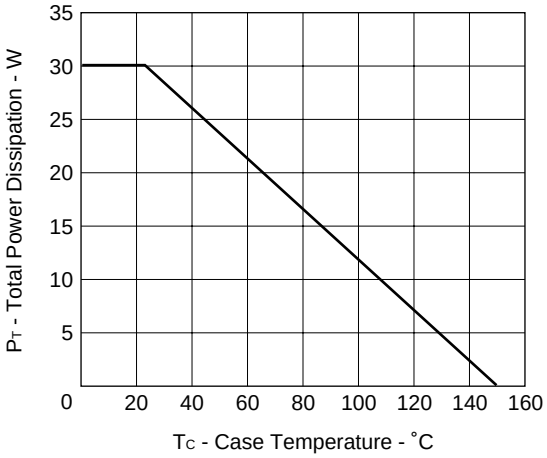
Test Circuit 2 Gate Charge



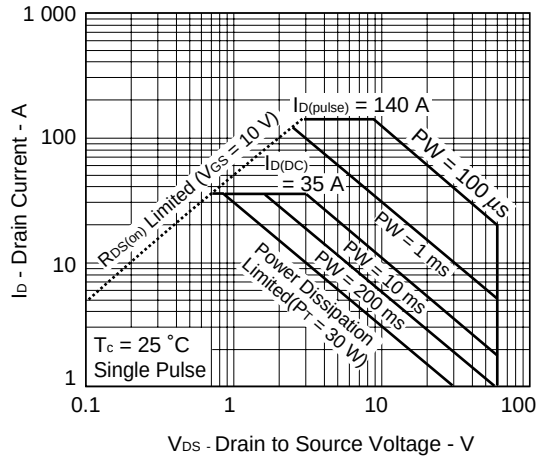
DERATING FACTOR OF FORWARD BIAS SAFE OPERATING AREA



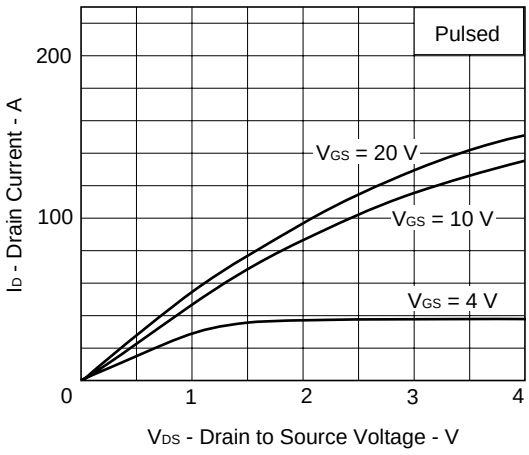
TOTAL POWER DISSIPATION vs. CASE TEMPERATURE



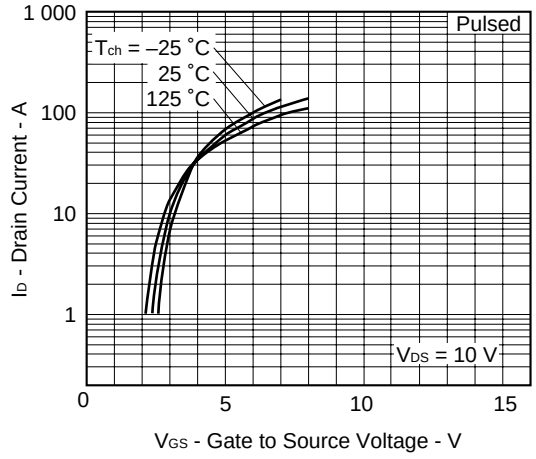
FORWARD BIAS SAFE OPERATING AREA



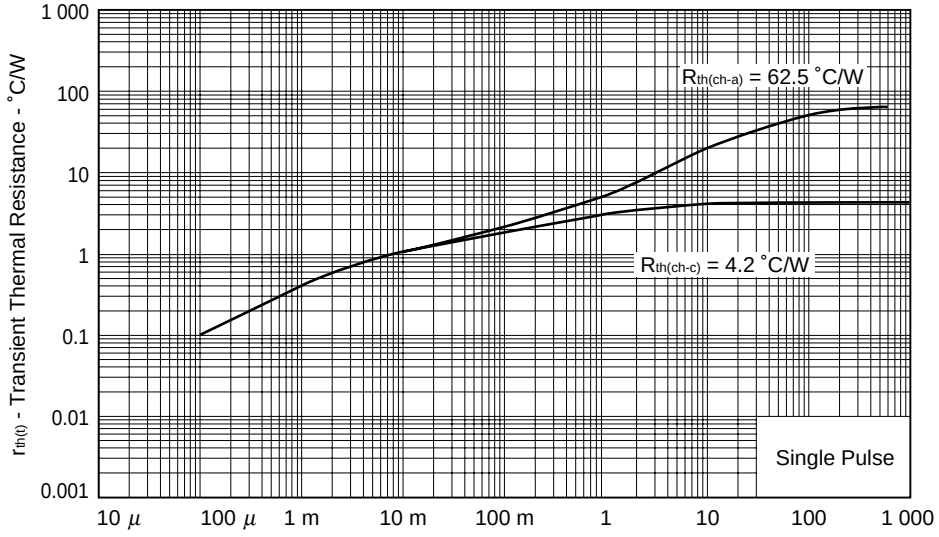
DRAIN CURRENT vs. DRAIN TO SOURCE VOLTAGE



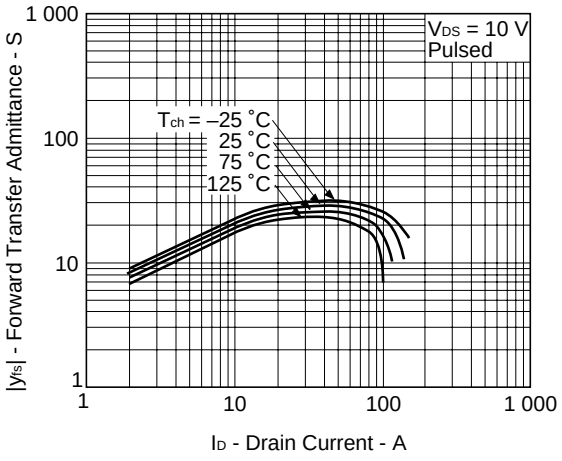
FORWARD TRANSFER CHARACTERISTICS



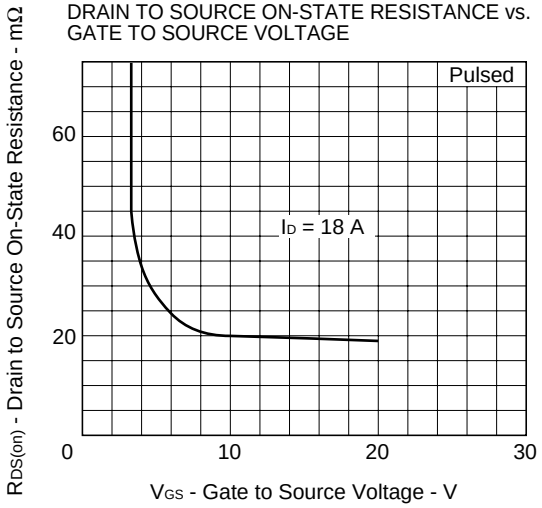
TRANSIENT THERMAL RESISTANCE vs. PULSE WIDTH



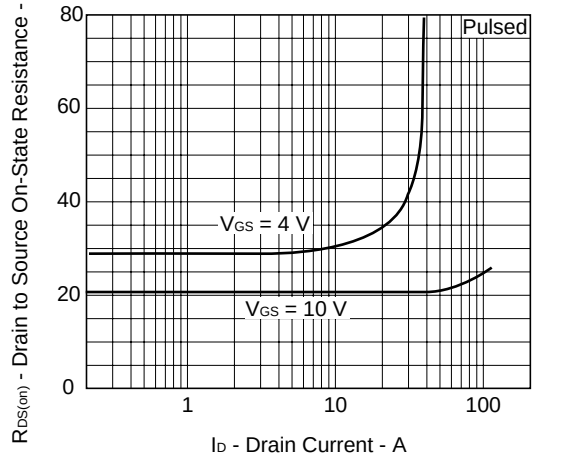
FORWARD TRANSFER ADMITTANCE vs. DRAIN CURRENT



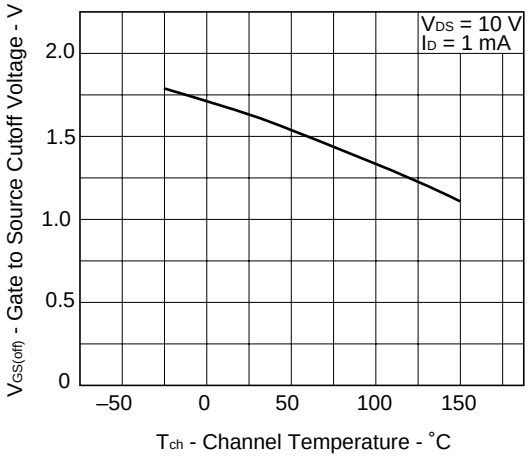
DRAIN TO SOURCE ON-STATE RESISTANCE vs. GATE TO SOURCE VOLTAGE



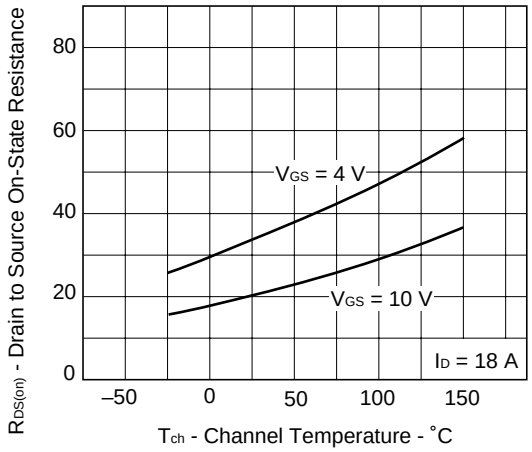
DRAIN TO SOURCE ON-STATE RESISTANCE vs. DRAIN CURRENT



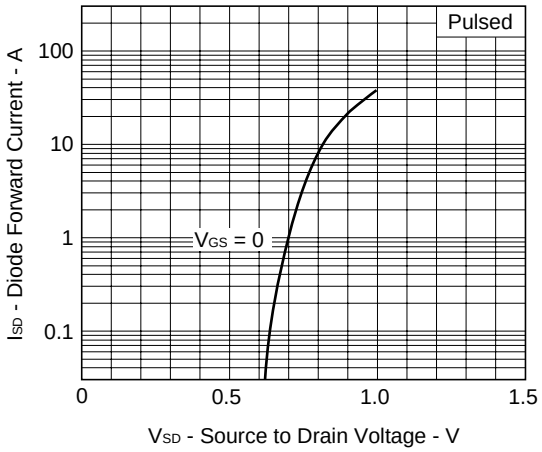
GATE TO SOURCE CUTOFF VOLTAGE vs. CHANNEL TEMPERATURE



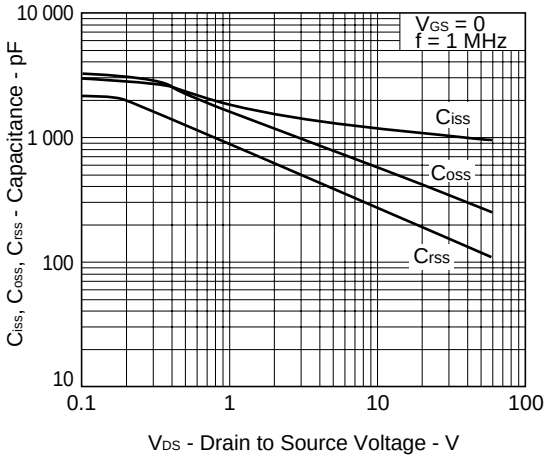
DRAIN TO SOURCE ON-STATE RESISTANCE vs. CHANNEL TEMPERATURE



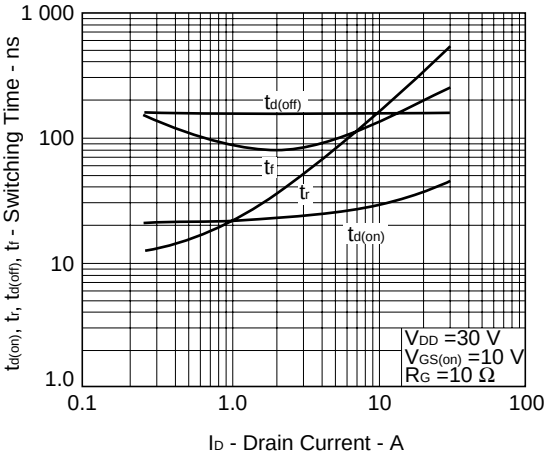
SOURCE TO DRAIN DIODE FORWARD VOLTAGE



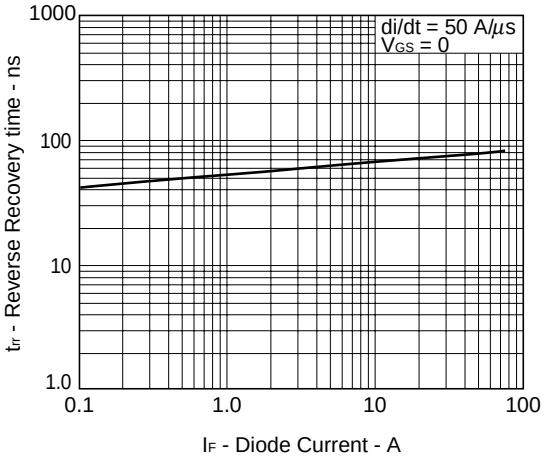
CAPACITANCE vs. DRAIN TO SOURCE VOLTAGE



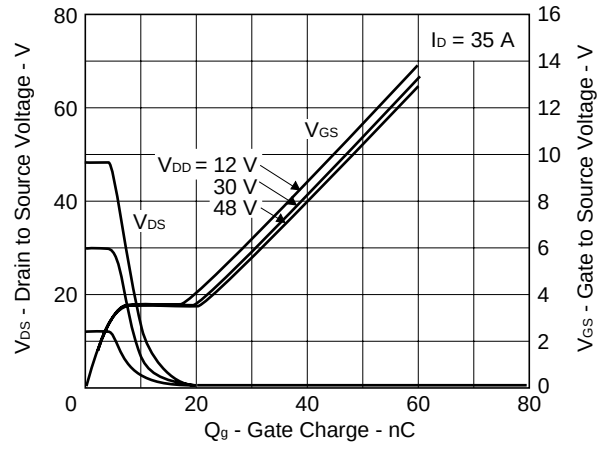
SWITCHING CHARACTERISTICS



REVERSE RECOVERY TIME vs. DRAIN CURRENT



DYNAMIC INPUT/OUTPUT CHARACTERISTICS



REFERENCE

Document Name	Document No.
NEC semiconductor device reliability/quality control system.	TEI-1202
Quality grade on NEC semiconductor devices.	IEI-1209
Semiconductor device mounting technology manual.	C10535E
Semiconductor device package manual.	C10943X
Guide to quality assurance for semiconductor devices.	MEI-1202
Semiconductor selection guide.	X10679E
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

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