

MOS FIELD EFFECT TRANSISTOR

2SK3481

SWITCHING N-CHANNEL POWER MOS FET

DESCRIPTION

The 2SK3481 is N-channel MOS Field Effect Transistor designed for high current switching applications.

FEATURES

- Super low on-state resistance:
- $R_{DS(on)1} = 50 \text{ m}\Omega \text{ MAX.} (V_{GS} = 10 \text{ V}, \text{ ID} = 15 \text{ A})$
- $R \mbox{DS(on)2}$ = 58 m Ω MAX. (VGs = 4.5 V, ID = 15 A)
- Low Ciss: Ciss = 2300 pF TYP.
- Built-in gate protection diode

ABSOLUTE MAXIMUM RATINGS (T_A = 25°C)

| Drain to Source Voltage (Vgs = 0 V) | Vdss | 100 | V |
|---|-------------|-------------|----|
| Gate to Source Voltage ($V_{DS} = 0 V$) | Vgss | ±20 | V |
| Drain Current (DC) (Tc = 25°C) | D(DC) | ±30 | А |
| Drain Current (pulse) ^{Note1} | D(pulse) | ±60 | А |
| Total Power Dissipation (Tc = 25°C) | P T1 | 56 | W |
| Total Power Dissipation (T _A = 25°C) | P T2 | 1.5 | W |
| Channel Temperature | Tch | 150 | °C |
| Storage Temperature | Tstg | -55 to +150 | °C |
| Single Avalanche Current Note2 | las | 26 | А |
| Single Avalanche Energy Note2 | Eas | 68 | mJ |
| | | | |

Notes 1. PW \leq 10 μ s, Duty cycle \leq 1%

2. Starting T_{ch} = 25°C, V_{DD} = 50 V, R_G = 25 Ω , V_{GS} = 20 \rightarrow 0 V

THERMAL RESISTANCE

| Channel to Case Thermal Resistance | Rth(ch-C) | 2.23 | °C/W |
|---------------------------------------|-----------|------|------|
| Channel to Ambient Thermal Resistance | Rth(ch-A) | 83.3 | °C/W |

ORDERING INFORMATION

| PART NUMBER | PACKAGE |
|-------------|---------------------------|
| 2SK3481 | TO-220AB |
| 2SK3481-S | TO-262 |
| 2SK3481-ZJ | TO-263 |
| 2SK3481-Z | TO-220SMD ^{Note} |

Note TO-220SMD package is produced only in Japan.

(TO-220AB)



(TO-262)



(TO-263, TO-220SMD)



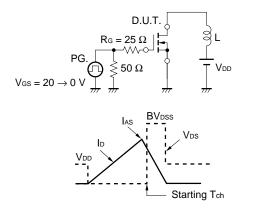
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ELECTRICAL CHARACTERISTICS (T_A = 25°C)

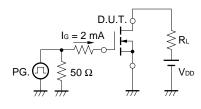
| CHARACTERISTICS | SYMBOL | TEST CONDITIONS | MIN. | TYP. | MAX. | UNIT |
|-------------------------------------|----------------------|---|------|------|------|------|
| Zero Gate Voltage Drain Current | IDSS | $V_{DS} = 100 V, V_{GS} = 0 V$ | | | 10 | μA |
| Gate Leakage Current | lgss | $V_{GS} = \pm 20 V, V_{DS} = 0 V$ | | | ±10 | μA |
| Gate Cut-off Voltage | V _{GS(off)} | V _{DS} = 10 V, I _D = 1 mA | 1.5 | 2.0 | 2.5 | V |
| Forward Transfer Admittance | y _{fs} | $V_{DS} = 10 V$, $I_D = 15 A$ | 9 | 18 | | S |
| Drain to Source On-state Resistance | RDS(on)1 | $V_{GS} = 10 V$, $I_D = 15 A$ | | 40 | 50 | mΩ |
| | RDS(on)2 | $V_{GS} = 4.5 V, I_D = 15 A$ | | 44 | 58 | mΩ |
| Input Capacitance | Ciss | V _{DS} = 10 V | | 2300 | | pF |
| Output Capacitance | Coss | V _{GS} = 0 V | | 230 | | pF |
| Reverse Transfer Capacitance | Crss | f = 1 MHz | | 120 | | pF |
| Turn-on Delay Time | td(on) | V _{DD} = 50 V, I _D = 15 A | | 13 | | ns |
| Rise Time | tr | V _{GS} = 10 V | | 10 | | ns |
| Turn-off Delay Time | td(off) | $R_G = 0 \Omega$ | | 53 | | ns |
| Fall Time | tr | | | 5.0 | | ns |
| Total Gate Charge | QG | VDD = 80 V | | 48 | | nC |
| Gate to Source Charge | QGS | V _{GS} = 10 V | | 7.0 | | nC |
| Gate to Drain Charge | Qgd | ID = 30 A | | 12 | | nC |
| Body Diode Forward Voltage | VF(S-D) | IF = 30 A, VGS = 0 V | | 1.0 | | V |
| Reverse Recovery Time | trr | IF = 30 A, VGS = 0 V | | 70 | | ns |
| Reverse Recovery Charge | Qrr | di/dt = 100 A/ μs | | 160 | | nC |

TEST CIRCUIT 1 AVALANCHE CAPABILITY

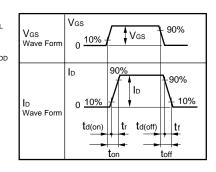
TEST CIRCUIT 2 SWITCHING TIME



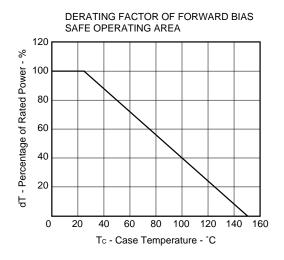
TEST CIRCUIT 3 GATE CHARGE

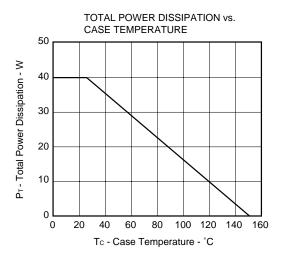


Data Sheet D15063EJ1V0DS

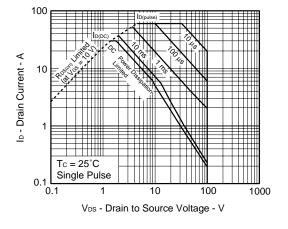


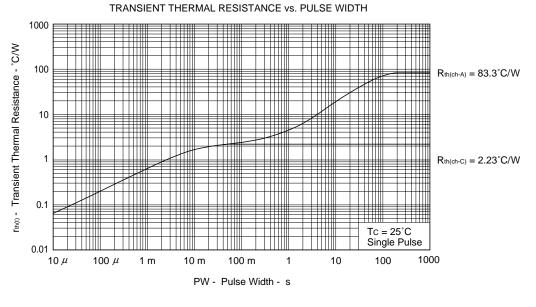
TYPICAL CHARACTERISTICS ($T_A = 25^{\circ}C$)





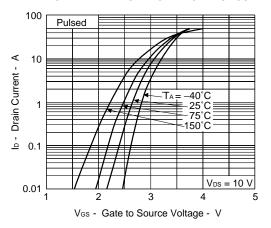
FORWARD BIAS SAFE OPERATING AREA



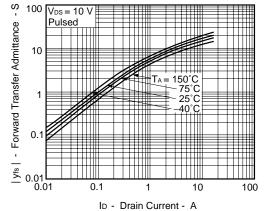


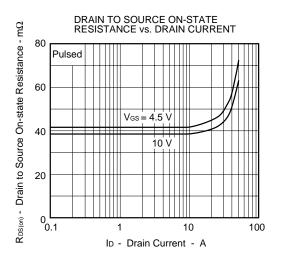
Data Sheet D15063EJ1V0DS

FORWARD TRANSFER CHARACTERISTICS

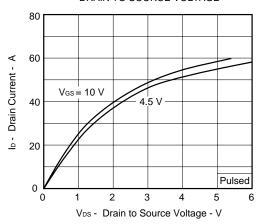




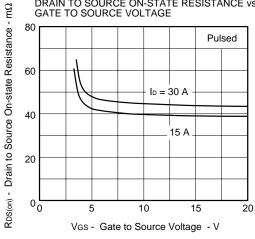




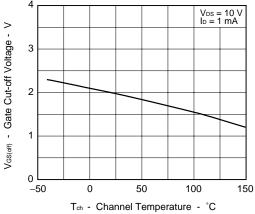
DRAIN CURRENT vs. DRAIN TO SOURCE VOLTAGE

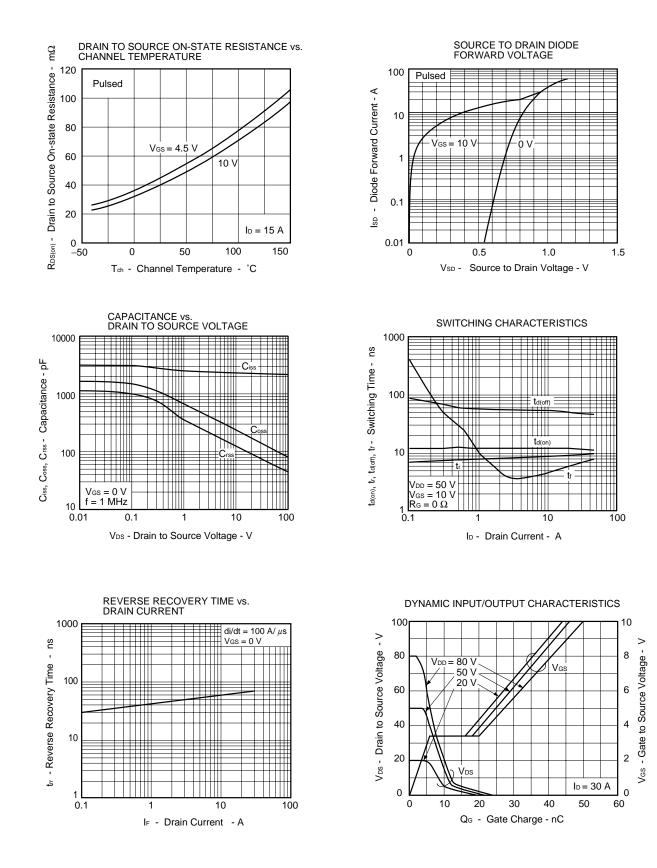


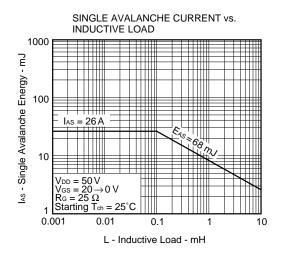
DRAIN TO SOURCE ON-STATE RESISTANCE vs. GATE TO SOURCE VOLTAGE

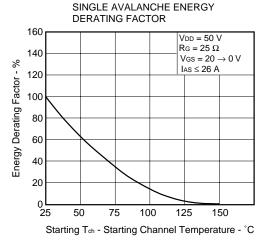






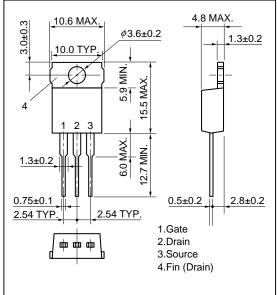




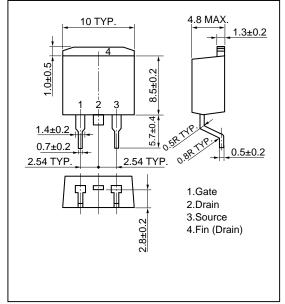


PACKAGE DRAWINGS (Unit: mm)

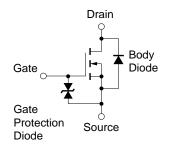
1) TO-220AB (MP-25)



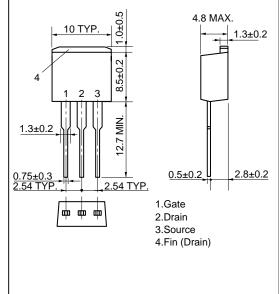
3) TO-263 (MP-25ZJ)



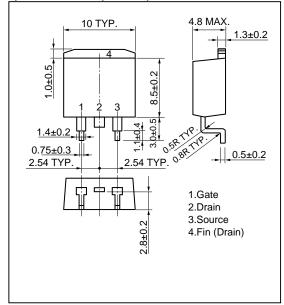
EQUIVALENT CIRCUIT



2) TO-262 (MP-25 Fin Cut)



4) TO-220SMD (MP-25Z)^{Note}



Note This package is produced only in Japan.

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

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