NEC

MOS FIELD EFFECT TRANSISTOR
2SK3405

SWITCHING
N-CHANNEL POWER MOS FET
INDUSTRIAL USE

DESCRIPTION

The 2SK3405 is N-Channel MOS FET device that features a low on-state resistance and excellent switching characteristics, designed for low voltage high current applications such as DC/DC converter with synchronous rectifier.

ORDERING INFORMATION

PART NUMBER	PACKAGE
2SK3405	TO-220AB
2SK3405-ZJ	TO-263

FEATURES

- 4.5-V drive available
- Low on-state resistance
  $R_{DS(on)1}$ = 9.0 mΩ MAX. (V_{GS} = 10 V, I_D = 24 A)
  $R_{DS(on)2}$ = 14.0 mΩ MAX. (V_{GS} = 4.5 V, I_D = 24 A)
- Low gate charge
  Q_G = 37 nC TYP. (I_D = 48 A, V_{DD} = 16 V, V_{GS} = 10 V)
- Built-in gate protection diode
- Surface mount device available

ABSOLUTE MAXIMUM RATINGS (T_A = 25°C)

Drain to Source Voltage (V_{GS} = 0 V)	V_{DSS}	20	V
Gate to Source Voltage (V_{DS} = 0 V)	V_{GSS}	±20	V
Drain Current (DC) (T_C = 25°C)	$I_{D(DC)}$	±48	A
Drain Current (Pulse) [Note]	$I_{D(pulse)}$	±144	A
Total Power Dissipation (T_A = 25°C)	P_{T1}	1.5	W
Total Power Dissipation (T_C = 25°C)	P_{T2}	48	W
Channel Temperature	T_{ch}	150	°C
Storage Temperature	T_{stg}	–55 to +150	°C

Note PW ≤ 10 μs, Duty Cycle ≤ 1%

The information contained in this document is being issued in advance of the production cycle for the device. The parameters for the device may change before final production or NEC Corporation, at its own discretion, may withdraw the device prior to its production.
Not all devices/types available in every country. Please check with local NEC representative for availability and additional information.

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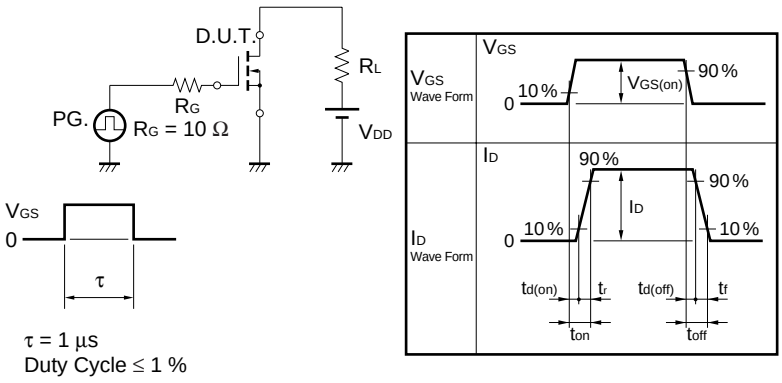
ELECTRICAL CHARACTERISTICS(T_A = 25°C)

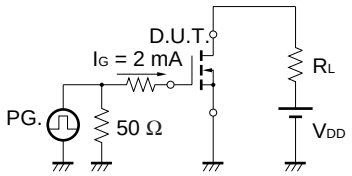
CHARACTERISTICS	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNIT
Drain Leakage Current	I_{DSS}	V_{DS} = 20 V, V_{GS} = 0 V			10	μA
Gate Leakage Current	I_{GSS}	V_{GS} = ±20 V, V_{DS} = 0 V			±10	μA
Gate Cut-off Voltage	$V_{GS(off)}$	V_{DS} = 10 V, I_D = 1 mA	1.5		2.5	V
Forward Transfer Admittance	$\|y_{fs}\|$	V_{DS} = 10 V, I_D = 24 A	12.0			S
Drain to Source On-state Resistance	$R_{DS(on)1}$	V_{GS} = 10 V, I_D = 24 A		6.5	9.0	mΩ
	$R_{DS(on)2}$	V_{GS} = 4.5 V, I_D = 24 A		9.9	14.0	mΩ
Input Capacitance	C_{iss}	V_{DS} = 10 V		1800		pF
Output Capacitance	C_{oss}	V_{GS} = 0 V		790		pF
Reverse Transfer Capacitance	C_{rss}	f = 1 MHz		420		pF
Turn-on Delay Time	$t_{d(on)}$	V_{DD} = 10 V , I_D = 24 A		97		ns
Rise Time	t_r	$V_{GS(on)}$ = 10 V		1700		ns
Turn-off Delay Time	$t_{d(off)}$	R_G = 10 Ω		140		ns
Fall Time	t_f			250		ns
Total Gate Charge	Q_G	V_{DD} = 16 V		37		nC
Gate to Source Charge	Q_{GS}	V_{GS} = 10 V		6.3		nC
Gate to Drain Charge	Q_{GD}	I_D = 48 A		11		nC
Diode Forward Voltage	$V_{F(S-D)}$	I_F = 48 A, V_{GS} = 0 V		1.0		V
Reverse Recovery Time	t_{rr}	I_F = 48 A, V_{GS} = 0 V		49		ns
Reverse Recovery Charge	Q_{rr}	di/dt = 100 A/μs		77		nC

TEST CIRCUIT 1 SWITCHING TIME



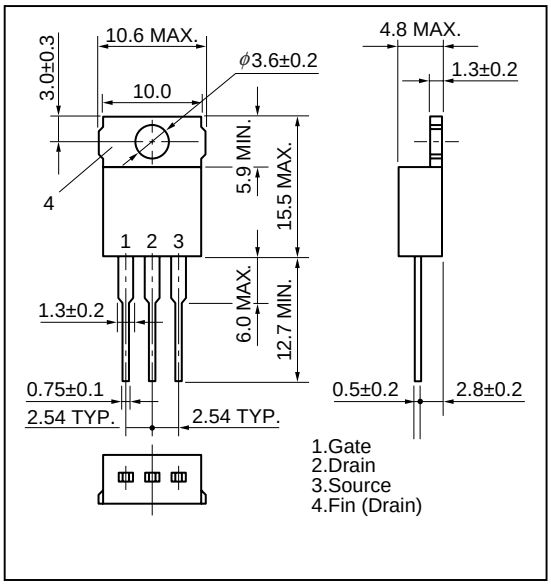
τ = 1 μs
Duty Cycle ≤ 1 %

TEST CIRCUIT 2 GATE CHARGE

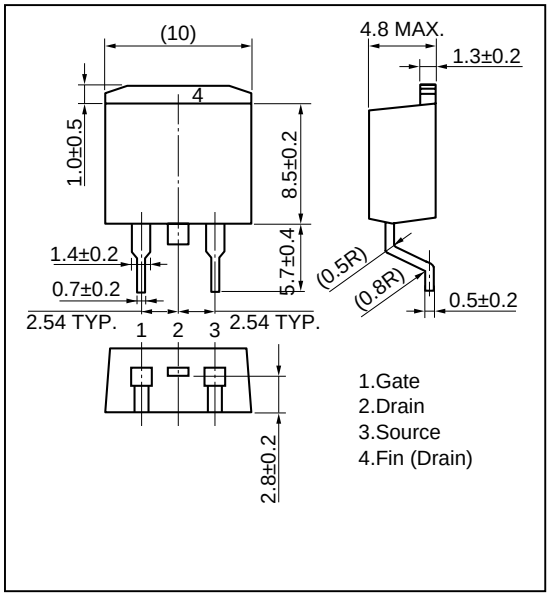


PACKAGE DRAWINGS (Unit : mm)

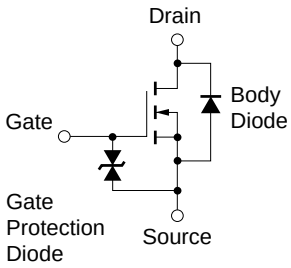
1)TO-220AB (MP-25)



2)TO-263 (MP-25ZJ)



EQUIVALENT CIRCUIT



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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