NEC

MOS FIELD EFFECT TRANSISTOR
2SK3457

SWITCHING
N-CHANNEL POWER MOS FET
INDUSTRIAL USE

DESCRIPTION

The 2SK3457 is N-channel DMOS FET device that features a low gate charge and excellent switching characteristics, designed for high voltage applications such as switching power supply.

ORDERING INFORMATION

PART NUMBER	PACKAGE
2SK3457	Isolated TO-220

FEATURES

- Low gate charge
  Q_G = 21 nC TYP. (V_{DD} = 450 V, V_{GS} = 10 V, I_D = 5.0 A)
- Gate voltage rating ±30 V
- Low on-state resistance
  $R_{DS(on)}$ = 2.2 Ω MAX. (V_{GS} = 10 V, I_D = 2.5 A)
- Avalanche capability ratings
- Isolated TO-220 package

ABSOLUTE MAXIMUM RATINGS (T_A = 25°C)

Drain to Source Voltage (V_{GS} = 0 V)	V_{DSS}	800	V
Gate to Source Voltage (V_{DS} = 0 V)	V_{GSS}	±30	V
Drain Current (DC) (T_C = 25°C)	$I_{D(DC)}$	±5.0	A
Drain Current (Pulse) Note1	$I_{D(pulse)}$	±15	A
Total Power Dissipation (T_A = 25°C)	P_{T1}	2.0	W
Total Power Dissipation (T_C = 25°C)	P_{T2}	40	W
Channel Temperature	T_{ch}	150	°C
Storage Temperature	T_{stg}	–55 to +150	°C
Single Avalanche Current Note2	I_{AS}	5.0	A
Single Avalanche Energy Note2	E_{AS}	77	mJ

Notes 1. PW ≤ 10 μs, Duty Cycle ≤ 1 %

2. Starting T_{ch} = 25 °C, V_{DD} = 150 V, R_G = 25 Ω, V_{GS} = 20 V → 0 V

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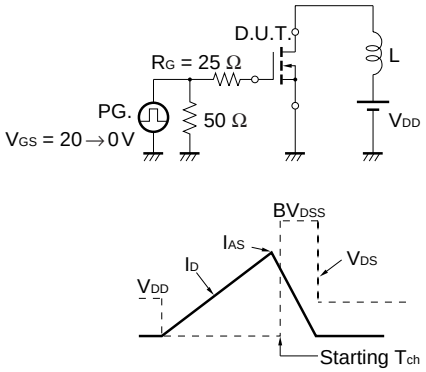
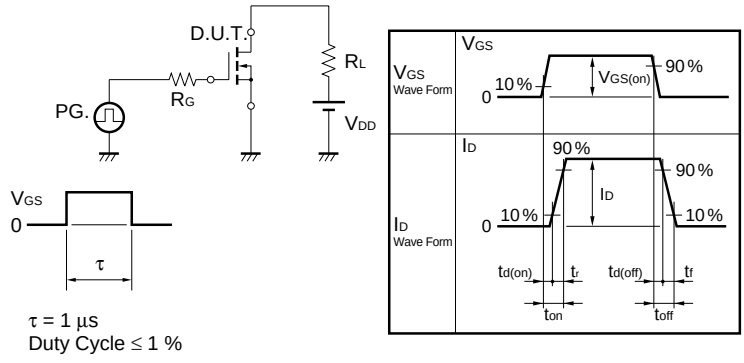
ELECTRICAL CHARACTERISTICS(T_A = 25°C)

CHARACTERISTICS	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNIT
Drain Leakage Current	I_{DSS}	V_{DS} = 800 V, V_{GS} = 0 V			100	μA
Gate Leakage Current	I_{GSS}	V_{GS} = ±30 V, V_{DS} = 0 V			±100	nA
Gate Cut-off Voltage	$V_{GS(off)}$	V_{DS} = 10 V, I_D = 1 mA	2.5		3.5	V
Forward Transfer Admittance	$\|y_{fs}\|$	V_{DS} = 10 V, I_D = 2.5 A	2.5			S
Drain to Source On-state Resistance	$R_{DS(on)}$	V_{GS} = 10 V, I_D = 2.5 A		1.8	2.2	Ω
Input Capacitance	C_{iss}	V_{DS} = 10 V		990		pF
Output Capacitance	C_{oss}	V_{GS} = 0 V		170		pF
Reverse Transfer Capacitance	C_{rss}	f = 1 MHz		40		pF
Turn-on Delay Time	$t_{d(on)}$	I_D = 2.5 A		16		ns
Rise Time	t_r	$V_{GS(on)}$ = 10 V		17		ns
Turn-off Delay Time	$t_{d(off)}$	V_{DD} = 150 V		52		ns
Fall Time	t_f	R_G = 10 Ω		18		ns
Total Gate Charge	Q_G	I_D = 5.0 A		21		nC
Gate to Source Charge	Q_{GS}	V_{DD} = 450 V		5.5		nC
Gate to Drain Charge	Q_{GD}	V_{GS} = 10 V		12		nC
Diode Forward Voltage	$V_{F(S-D)}$	I_F = 5.0 A, V_{GS} = 0 V		1.0		V
Reverse Recovery Time	t_{rr}	I_F = 5.0 A, V_{GS} = 0 V		630		ns
Reverse Recovery Charge	Q_{rr}	di/dt = 50 A/μs		3.4		μC

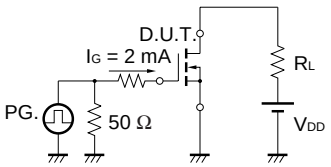
TEST CIRCUIT 1 AVALANCHE CAPABILITY



TEST CIRCUIT 2 SWITCHING TIME

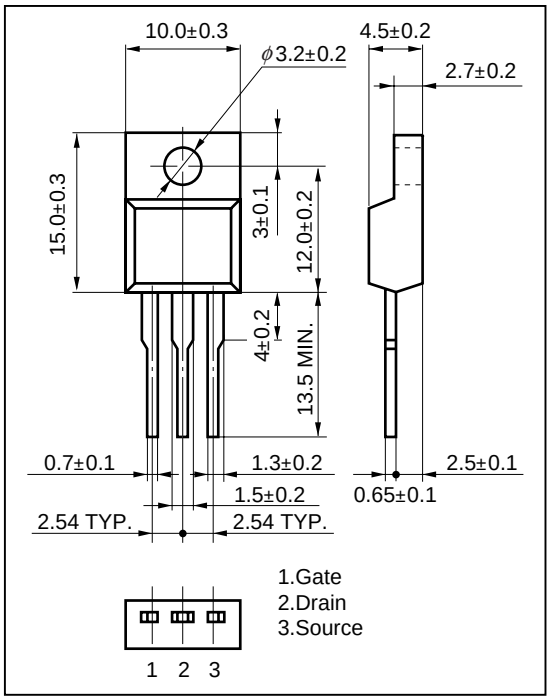


TEST CIRCUIT 3 GATE CHARGE

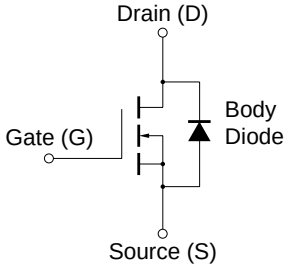


PACKAGE DRAWING (Unit : mm)

Isolated TO-220 (MP-45F)



EQUIVALENT CIRCUIT



Remark Strong electric field, when exposed to this device, can cause destruction of the gate oxide and ultimately degrade the device operation. Steps must be taken to stop generation of static electricity as much as possible, and quickly dissipate it once, when it has occurred.

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