

SWITCHING
N-CHANNEL POWER MOS FET
INDUSTRIAL USE

Description

The 2SK3114 is N-Channel DMOS FET device that features a low gate charge and excellent switching characteristics, and designed for high voltage applications such as switching power supply, AC adapter.

Ordering Information

Part Number	Package
2SK3114	Isolated TO-220

Features

- Low gate charge :
 $Q_G = 15 \text{ nC TYP. (} V_{DD} = 450 \text{ V, } V_{GS} = 10 \text{ V, } I_D = 4.0 \text{ A)}$
- Gate voltage rating : $\pm 30 \text{ V}$
- Low On-state resistance :
 $R_{DS(on)} = 2.2 \Omega \text{ MAX. (} V_{GS} = 10 \text{ V, } I_D = 2.0 \text{ A)}$
- Avalanche Capability Ratings
- Isolated TO-220 package

Absolute Maximum Ratings (T_A = 25 °C)

Drain to source voltage (V _{GS} = 0 V)	V _{DSS}	600	V
Gate to source voltage (V _{DS} = 0 V)	V _{GSS}	±30	V
Drain current (DC) (T _C = 25 °C)	I _{D(DC)}	±4.0	A
Drain current (pulse) ^{Note1}	I _{D(pulse)}	±16	A
Total power dissipation (T _A = 25 °C)	P _{T1}	2.0	W
Total power dissipation (T _C = 25 °C)	P _{T2}	30	W
Channel temperature	T _{ch}	150	°C
Storage temperature	T _{stg}	-55 to +150	°C
Single avalanche current ^{Note2}	I _{AS}	4.0	A
Single avalanche energy ^{Note2}	E _{AS}	10.7	mJ
Diode recovery dv/dt ^{Note3}	dv/dt	3.5	V/ns

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

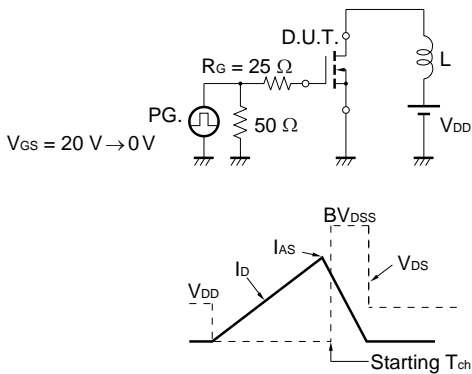
3. I_F ≤ 2.0 A, V_{clamp} = 600 V, di/dt ≤ 100 A / μs, T_A = 25 °C

The information in this document is subject to change without notice

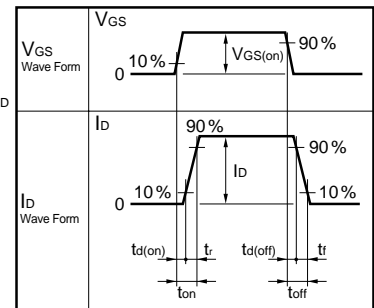
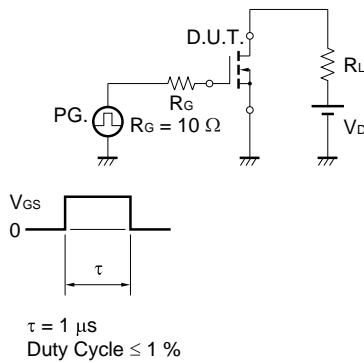
Electrical Characteristics (T_A = 25 °C)

Characteristics	Symbol	MIN.	TYP.	MAX.	Unit	Test Conditions
Drain leakage current	I _{DSS}			100	μA	V _{DS} = 600 V, V _{GS} = 0 V
Gate leakage current	I _{GSS}			±10	μA	V _{GS} = ±30 V, V _{DS} = 0 V
Gate cutoff voltage	V _{GS(off)}	2.5		3.5	V	V _{DS} = 10 V, I _D = 1 mA
Forward transfer admittance	y _{fs}	1.0			S	V _{DS} = 10 V, I _D = 2.0 A
Drain to source on-state resistance	R _{DS(on)}		1.6	2.2	Ω	V _{GS} = 10 V, I _D = 2.0 A
Input capacitance	C _{iss}		550		pF	V _{DS} = 10 V, V _{GS} = 0 V, f = 1 MHz
Output capacitance	C _{oss}		115		pF	
Reverse transfer capacitance	C _{rss}		13		pF	
Turn-on delay time	t _{d(on)}		12		ns	V _{DD} = 150 V, I _D = 2.0 A, V _{GS(on)} = 10 V, R _G = 10 Ω, R _L = 10 Ω
Rise time	t _r		6		ns	
Turn-off delay time	t _{d(off)}		35		ns	
Fall time	t _f		12		ns	
Total gate charge	Q _G		15		nC	V _{DD} = 450 V, V _{GS} = 10 V, I _D = 4.0 A
Gate to source charge	Q _{GS}		4		nC	
Gate to drain charge	Q _{GD}		4.4		nC	
Diode forward voltage	V _{F(S-D)}		0.9		V	I _F = 4.0 A, V _{GS} = 0 V
Reverse recovery time	t _{rr}		1.3		μs	I _F = 4.0 A, V _{GS} = 0 V, di/dt = 50 A/μs
Reverse recovery charge	Q _{rr}		4.3		μC	

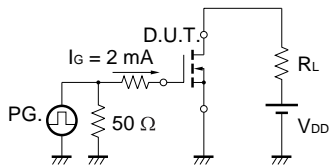
Test Circuit 1 Avalanche Capability



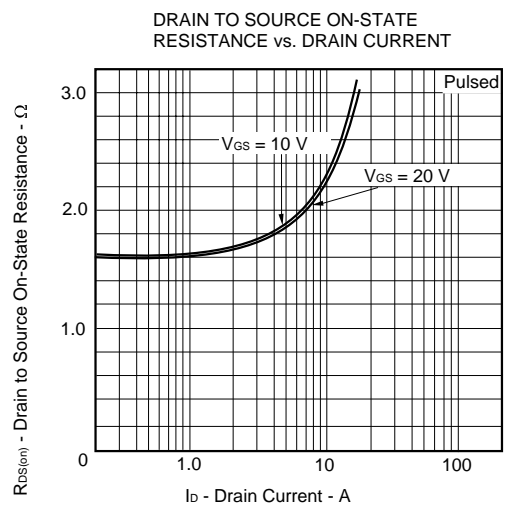
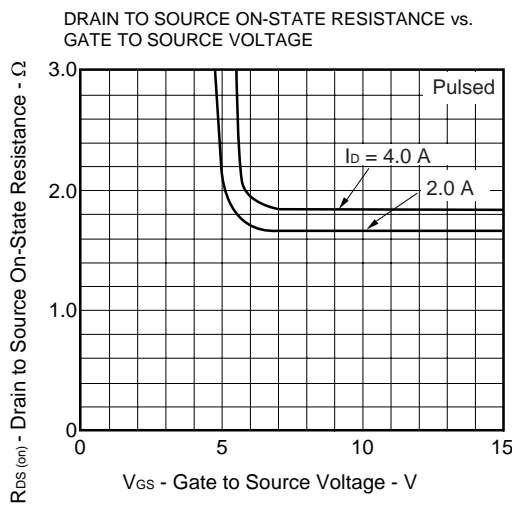
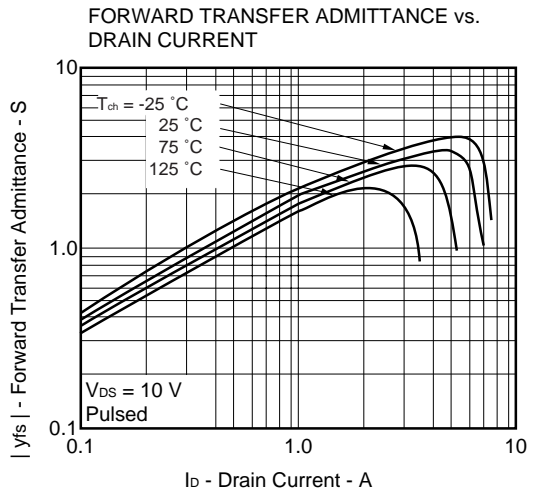
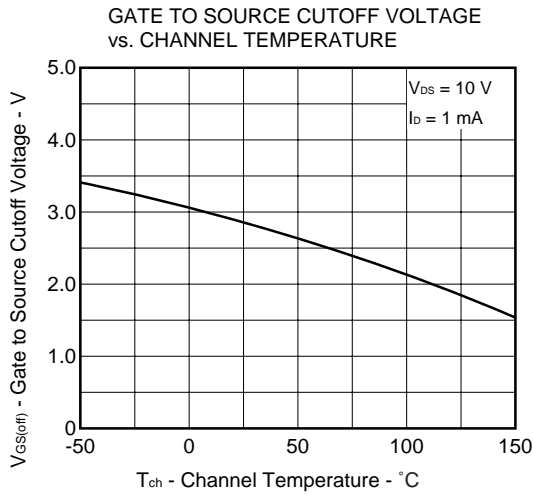
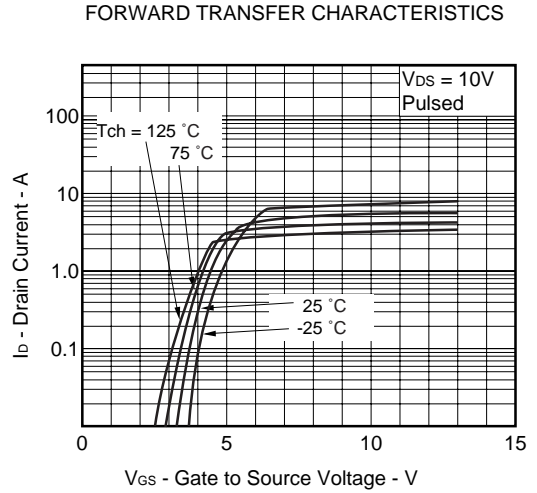
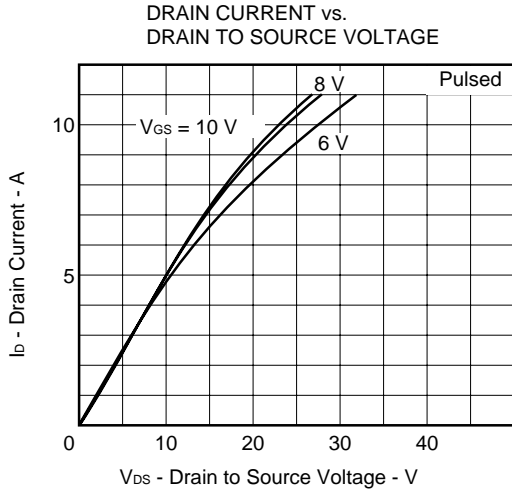
Test Circuit 2 Switching Time



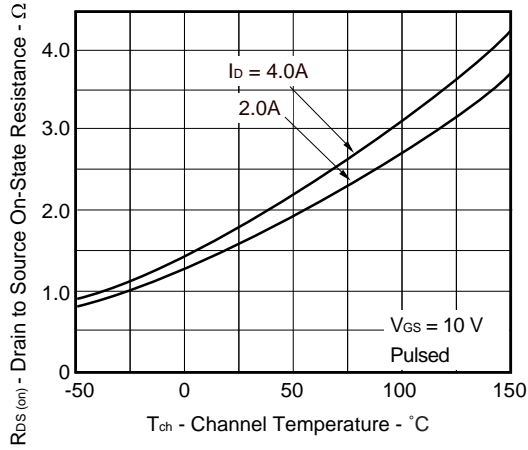
Test Circuit 3 Gate Charge



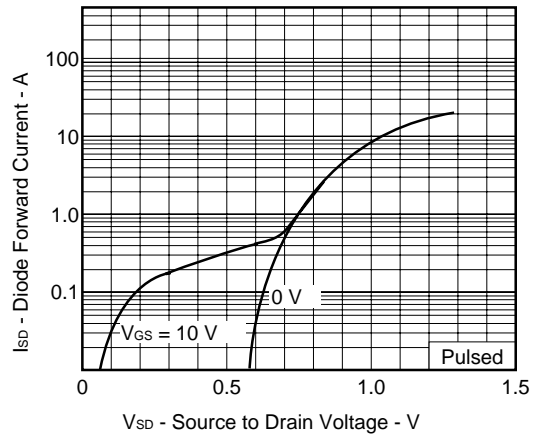
Typical Characteristics (T_A = 25 °C)



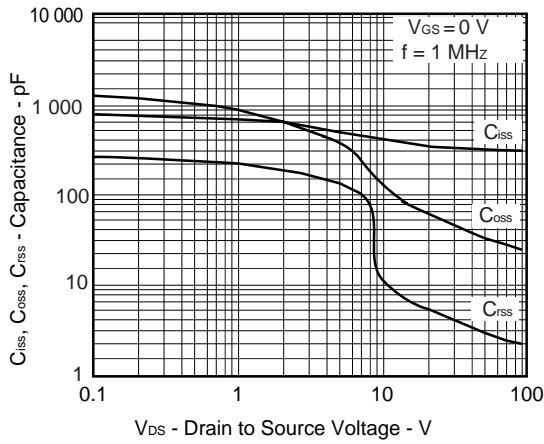
DRAIN TO SOURCE ON-STATE RESISTANCE vs. CHANNEL TEMPERATURE



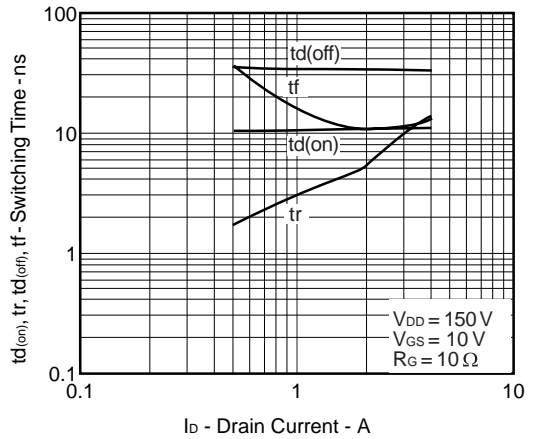
SOURCE TO DRAIN DIODE FORWARD VOLTAGE



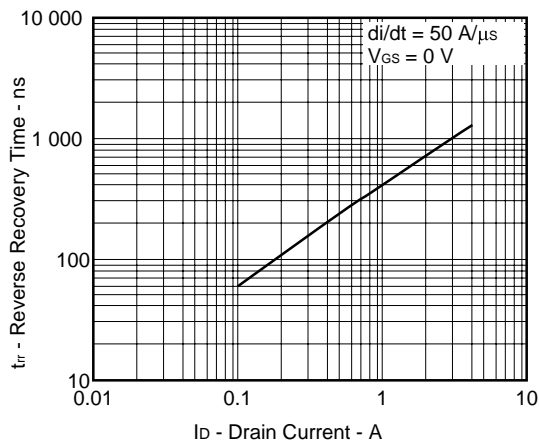
CAPACITANCE vs. DRAIN TO SOURCE VOLTAGE



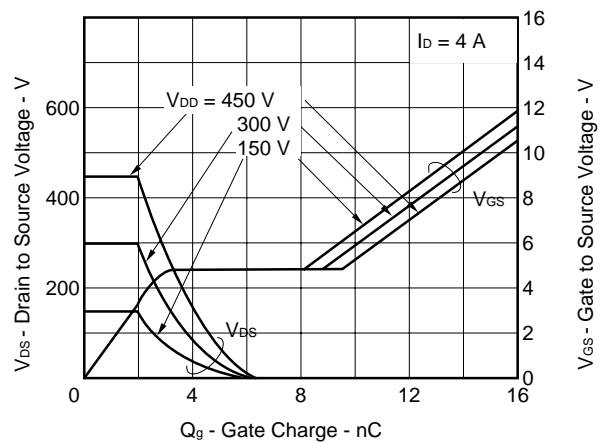
SWITCHING CHARACTERISTICS



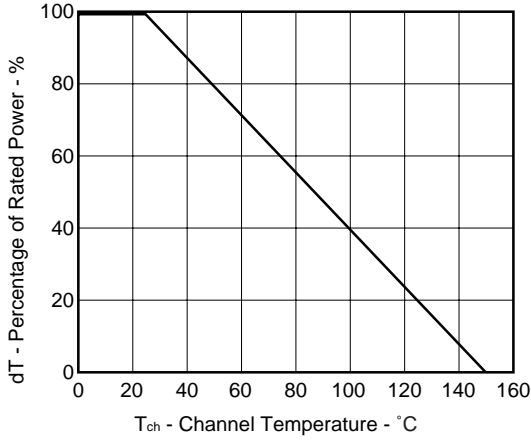
REVERSE RECOVERY TIME vs. DRAIN CURRENT



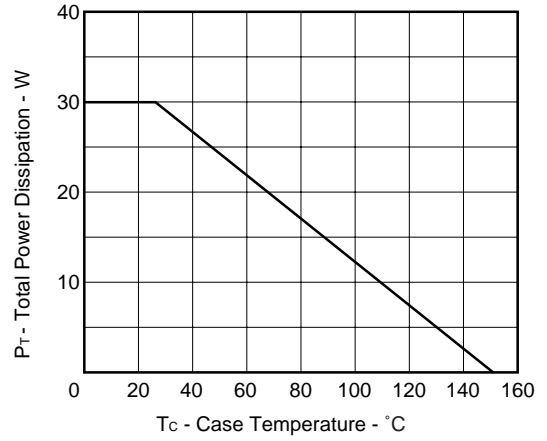
DYNAMIC INPUT/OUTPUT CHARACTERISTICS



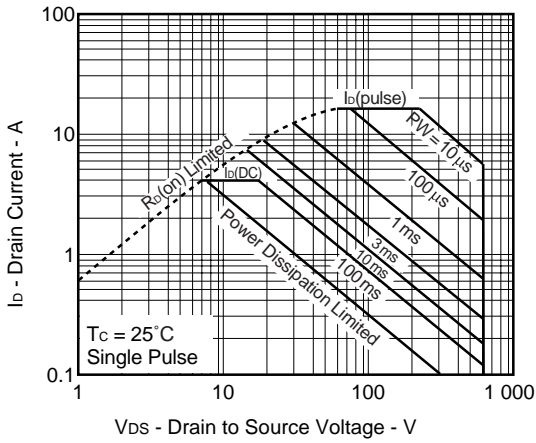
DERATING FACTOR OF FORWARD BIAS SAFE OPERATING AREA



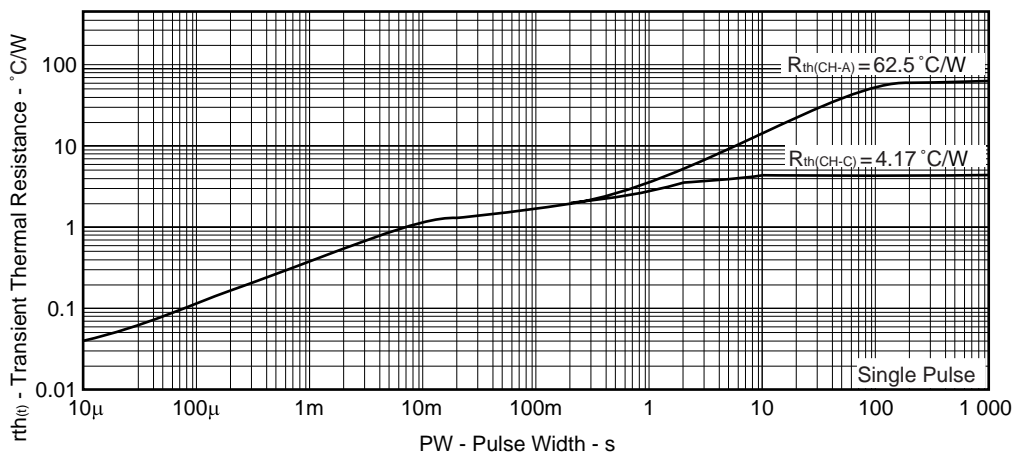
TOTAL POWER DISSIPATION vs. CASE TEMPERATURE

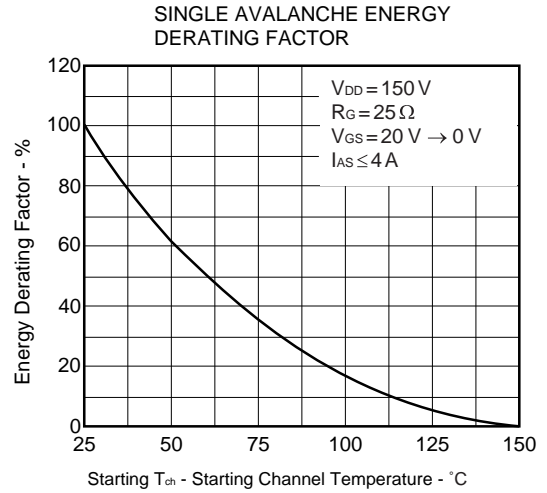
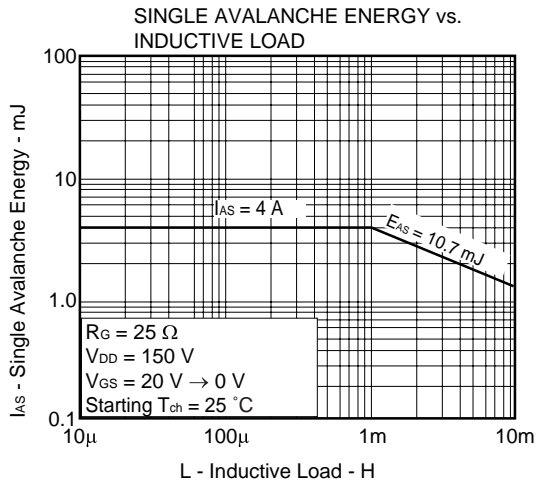


FORWARD BIAS SAFE OPERATING AREA



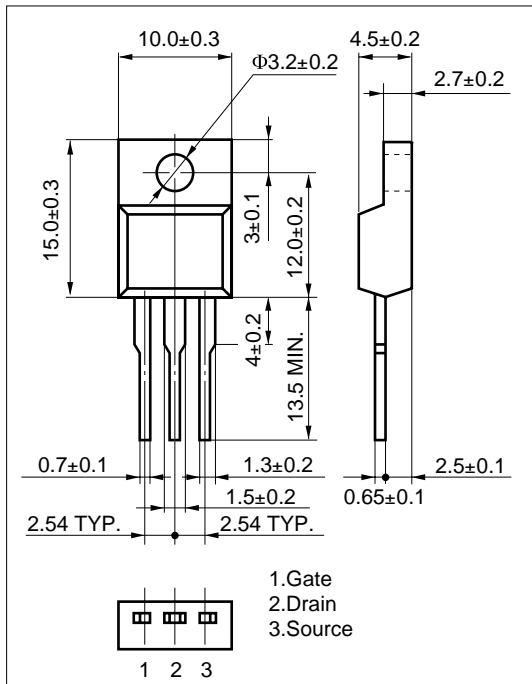
TRANSIENT THERMAL RESISTANCE vs. PULSE WIDTH



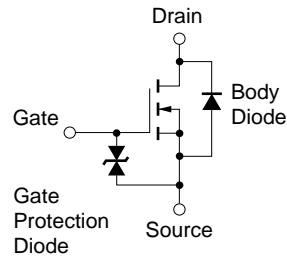


Package Drawing (Unit : mm)

Isolated TO-220 (MP-45F)



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.

[MEMO]

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Anti-radioactive design is not implemented in this product.