

# Switching (450V, 5A)

## 2SK2713

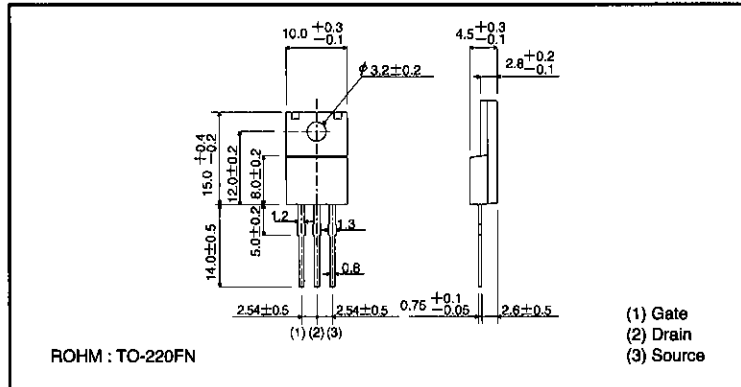
●Features

- 1) Low on-resistance.
- 2) High-speed switching.
- 3) Wide SOA (safe operating area).
- 4) Gate-source voltage guaranteed at  $V_{GS} = \pm 30V$ .
- 5) Easily designed drive circuits.
- 6) Easy to use in parallel.

●Structure

Silicon N-channel  
MOSFET transistor

●External dimensions (Units: mm)



MOSFET

●Absolute maximum ratings ( $T_a = 25^\circ C$ )

Parameter	Symbol	Limits	Unit
Drain-source voltage	$V_{DS}$	450	V
Gate-source voltage	$V_{GS}$	$\pm 30$	V
Drain current	Continuous	$I_D$	5 A
	Pulsed	$I_{DP}^*$	20 A
Drain reverse current	Continuous	$I_{DR}$	5 A
	Pulsed	$I_{DRP}^*$	20 A
Total power dissipation ( $T_c=25^\circ C$ )	$P_D$	30	W
Channel temperature	$T_{ch}$	150	$^\circ C$
Storage temperature	$T_{stg}$	$-55 \sim 150$	$^\circ C$

\*  $P_w \leq 10 \mu s$ , Duty cycle  $\leq 1\%$

●Packaging specifications

Type	Package	Bulk
	Code	—
	Basic ordering unit (pieces)	500
2SK2713		○

●Electrical characteristics (Ta = 25°C)

Parameter	Symbol	Min.	Typ.	Max.	Unit	Conditions
Gate leakage current	I <sub>GSS</sub>	—	—	±100	nA	V <sub>GS</sub> =±30V, V <sub>DS</sub> =0V
Drain-source breakdown voltage	V <sub>(BR)DSS</sub>	450	—	—	V	I <sub>D</sub> =1mA, V <sub>GS</sub> =0V
Drain cutoff current	I <sub>DSS</sub>	—	—	100	μA	V <sub>DS</sub> =450V, V <sub>GS</sub> =0V
Gate threshold voltage	V <sub>GS(th)</sub>	2	—	4	V	V <sub>DS</sub> =10V, I <sub>D</sub> =1mA
Drain-source on-state resistance	R <sub>DS(on)</sub>	—	1	1.4	Ω	I <sub>D</sub> =2.5A, V <sub>GS</sub> =10V
Forward propagation admittance	Y <sub>fs</sub>	1	3.0	—	S	V <sub>DS</sub> =10V, I <sub>D</sub> =2.5A
Input capacitance	C <sub>iss</sub>	—	600	—	pF	V <sub>DS</sub> =10V
Output capacitance	C <sub>oss</sub>	—	135	—	pF	V <sub>GS</sub> =0V
Reverse transfer capacitance	C <sub>rss</sub>	—	53	—	pF	f=1MHz
Turn-on delay time	t <sub>d(on)</sub>	—	14	—	ns	I <sub>D</sub> =2.5A, V <sub>DD</sub> ≈150V
Rise time	t <sub>r</sub>	—	17	—	ns	V <sub>GS</sub> ≈10V
Turn-off delay time	t <sub>d(off)</sub>	—	50	—	ns	R <sub>L</sub> =60Ω
Fall time	t <sub>f</sub>	—	35	—	ns	R <sub>G</sub> =10Ω
Reverse recovery time	t <sub>rr</sub>	—	300	—	ns	I <sub>DR</sub> =5A, V <sub>GS</sub> =0V
Reverse recovery load	Q <sub>rr</sub>	—	1.8	—	μC	di/dt=100A/μs

●Electrical characteristic curves

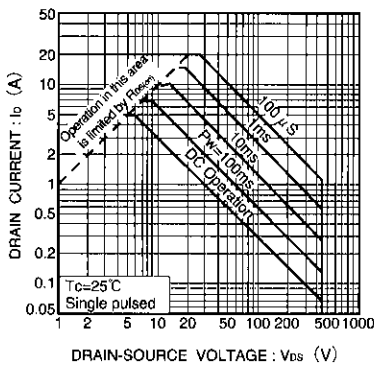


Fig.1 Maximum Safe Operating Area

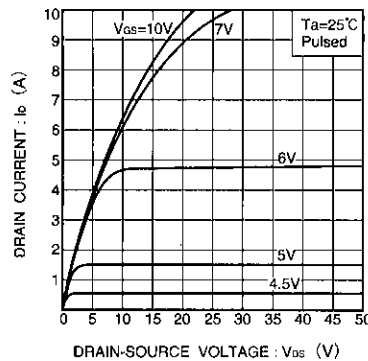


Fig.2 Typical Output Characteristics

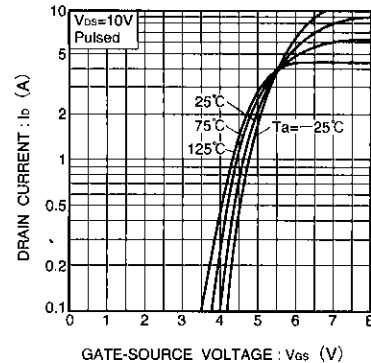


Fig.3 Typical Transfer Characteristics

● Electrical characteristic curves

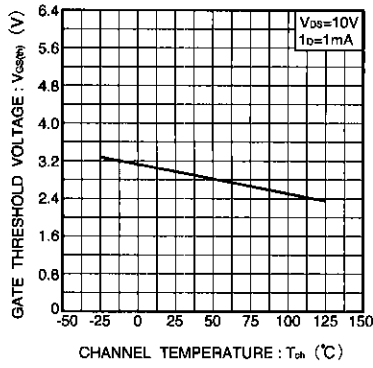


Fig.4 Gate Threshold Voltage vs. Channel Temperature

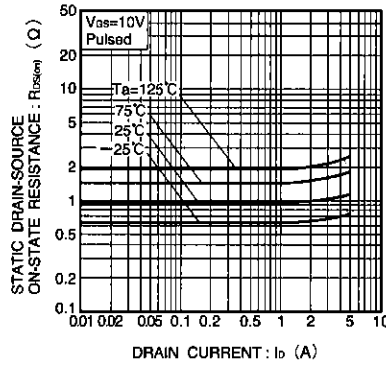


Fig.5 Static Drain-Source On-State Resistance vs. Drain Current

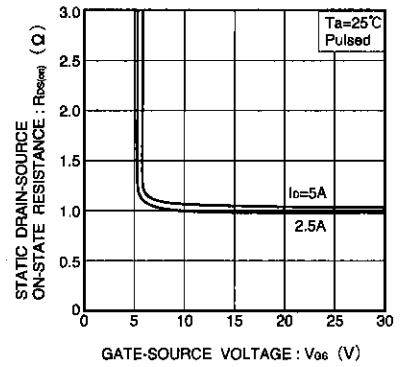


Fig.6 Static Drain-Source On-State Resistance vs. Gate-Source Voltage

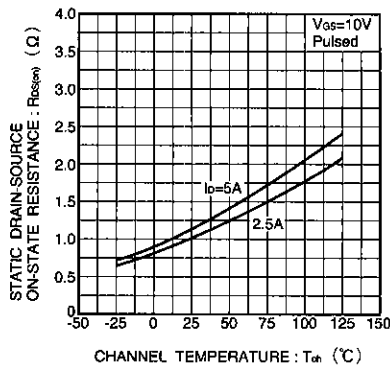


Fig.7 Static Drain-Source On-State Resistance vs. Channel Temperature

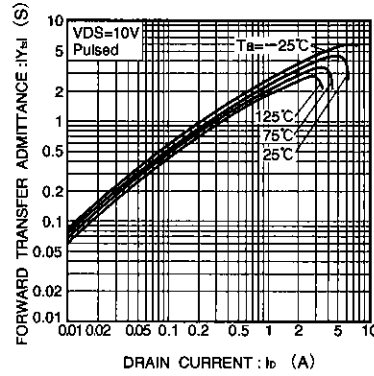


Fig.8 Forward Transfer Admittance vs. Drain Current

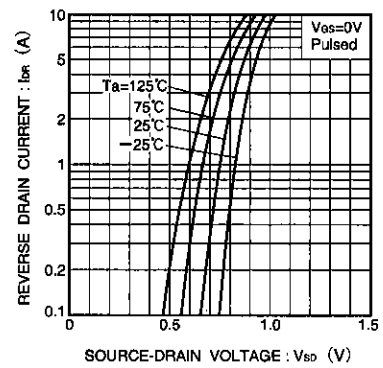


Fig.9 Reverse Drain Current vs. Source-Drain Voltage

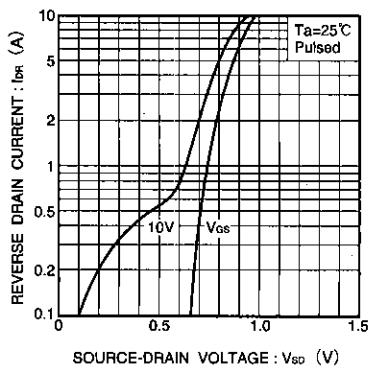


Fig.10 Reverse Drain Current vs. Source-Drain Voltage

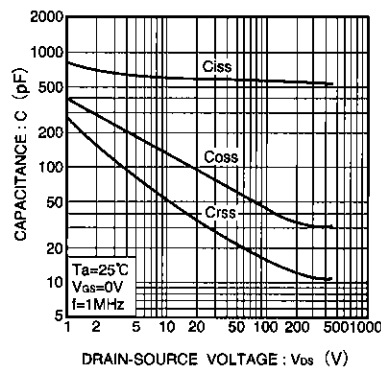


Fig.11 Typical Capacitance vs. Drain-Source Voltage

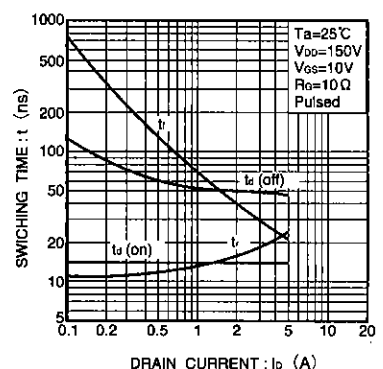


Fig.12 Switching Characteristics (See Figure. 16 and 17 for measurement circuits)

MOS FET

●Electrical characteristic curves

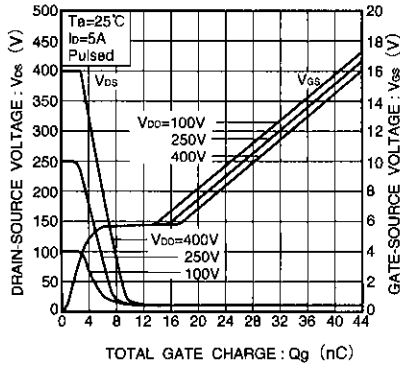


Fig.13 Dynamic Input Characteristics (See Figure. 18 for measurement circuit)

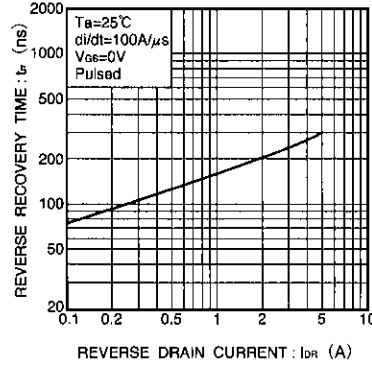


Fig.14 Reverse Recovery Time vs. Reverse Drain Current

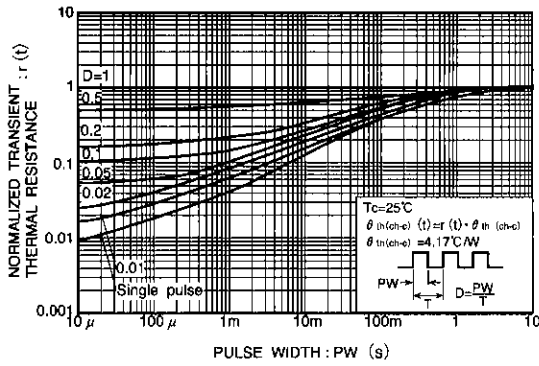


Fig.15 Normalized Transient Thermal Resistance vs. Pulse Width

●Switching characteristics measurement circuit

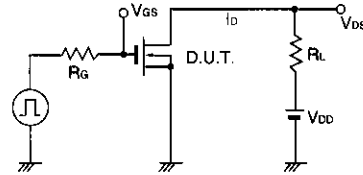


Fig.16 Switching Time Measurement Circuit

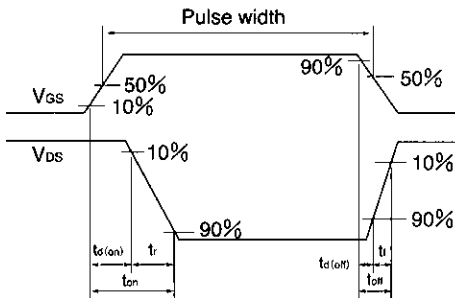


Fig.17 Switching Time Waveforms

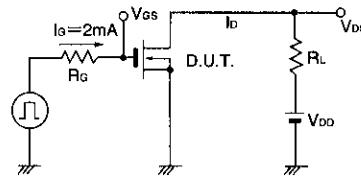


Fig.18 Gate Charge Measurement Circuit

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