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April 1<sup>st</sup>, 2010 Renesas Electronics Corporation

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# N-CHANNEL MOS FIELD EFFECT POWER TRANSISTOR 2SK1285

# SWITCHING N-CHANNEL POWER MOS FET

### **DESCRIPTION**

The 2SK1285 is N-channel MOS Field Effect Transistor designed for solenoid, motor and lamp driver.

### **FEATURES**

· Low on-state resistance

 $R_{DS(on)}$  = 0.32  $\Omega$  MAX. (Vgs = 10 V, Ip = 2 A)

 $R_{DS(on)}$  = 0.40  $\Omega$  MAX. (Vgs = 4 V, Ip = 2 A)

- Low Ciss Ciss = 500 pF TYP.
- Built-in G-S gate protection diodes

### **QUALITY GRADE**

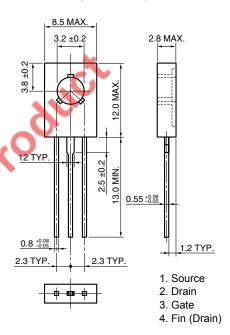
### Standard

Please refer to "Quality Grades on NEC Semiconductor Devices" (Document No. C11531E) published by NEC Electronics Corporation to know the specification of quality grade on the devices and its recommended applications.

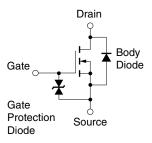
### **ABSOLUTE MAXIMUM RATINGS**

Maximum Tem	peratures		
Storage Tem	nperature <	-55 to +150	°C
Channel Temperature		150	°C MAX.
Maximum Pow	er Dissipation		
Total Power	Dissipation (T <sub>A</sub> = 25°C)	1.3	W
Total Power	Dissipation (Tc = 25°C)	20	W
Maximum Volta	ages and Currents (TA = 25°	C)	
VDSS	Drain to Source Voltage	100	V
VGSS(AC)	Gate to Source Voltage	±20	V
ID(DC)	Drain Current (DC)	±3.0	Α
ID(pulse) Note	Drain Current (pulse)	±12	Α
Note PW≤	10 $\mu$ s, Duty Cycle ≤ 1%		

# PACKAGE DRAWING (Unit: mm)



### **EQUIVALENT CIRCUIT**



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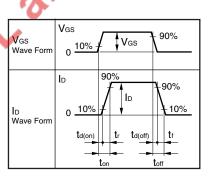


### ELECTRICAL CHARACTERISTICS (TA = 25°C)

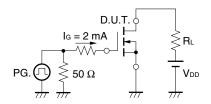
CHARACTERISTICS	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNIT
Drain to Source On-state Resistance	RDS(on)	V <sub>GS</sub> = 10 V, I <sub>D</sub> = 2 A		0.26	0.32	Ω
		V <sub>GS</sub> = 4.0 V, I <sub>D</sub> = 2 A		0.32	0.40	Ω
Gate to Source Cutoff Voltage	V <sub>GS(off)</sub>	V <sub>DS</sub> = 10 V, I <sub>D</sub> = 1 mA	1.0		2.5	V
Forward Transfer Admittance	<b>y</b> fs	V <sub>DS</sub> = 10 V, I <sub>D</sub> = 2 A	2.4			S
Drain Leakage Current	IDSS	V <sub>DS</sub> = 100 V, V <sub>GS</sub> = 0 V			10	μΑ
Gate to Source Leakage Current	Igss	$V_{DS} = \pm 20 \text{ V}, V_{DS} = 0 \text{ V}$			±10	μΑ
Input Capacitance	Ciss	V <sub>DS</sub> = 10 V		500		pF
Output Capacitance	Coss	V <sub>GS</sub> = 0 V		160		pF
Reverse Transfer Capacitance	Crss	f = 1 MHz		20		pF
Turn-on Delay Time td		V <sub>GS(on)</sub> = 10 V		40		ns
Rise Time	tr	V <sub>DD</sub> = 50 V		55		ns
Turn-off Delay Time	t <sub>d(off)</sub>	I <sub>D</sub> = 2 A, R <sub>G</sub> = 10 Ω		500		ns
Fall Time	tf	R <sub>L</sub> = 15 Ω		120		ns
Total Gate Charge	QG	V <sub>GS</sub> = 10 V	V	13		nC
Gate to Source Charge	QGS	I <sub>D</sub> = 3 V		3		nC
Gate to Drain Charge	Q <sub>GD</sub>	V <sub>DD</sub> = 80 V		2		nC
Diode Forward Voltage	Vsp	I <sub>SD</sub> = 3 A, V <sub>GS</sub> = 0 V		0.9		V
Reverse Recovery Time	trr	IF = 3A, V <sub>GS</sub> = 0		140		ns
Reverse Recovery Charge	Qrr	di/dt = 50 A/μs		250		nC

### **TEST CIRCUIT 1 SWITCHING TIME**

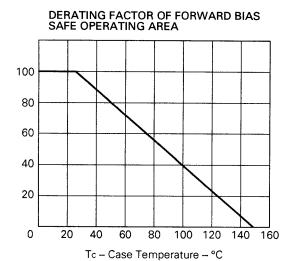
# PG. $\uparrow$ $\tau = 1 \mu s$ Duty Cycle $\leq 1\%$

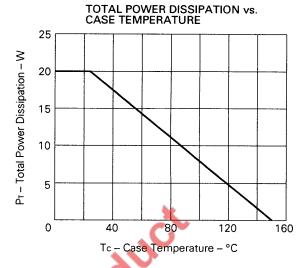


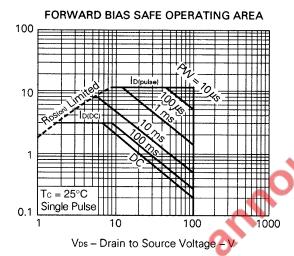
### **TEST CIRCUIT 2 GATE CHARGE**

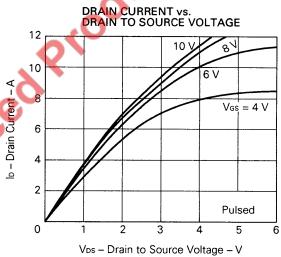


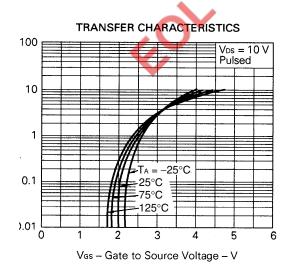
### TYPICAL CHARACTERISTICS (TA = 25°C)



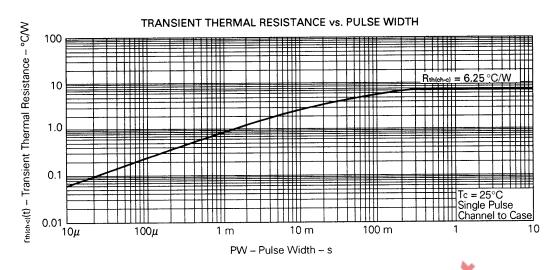


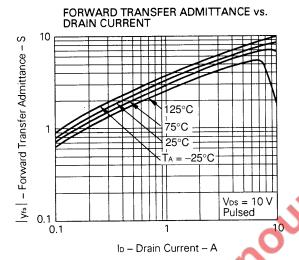


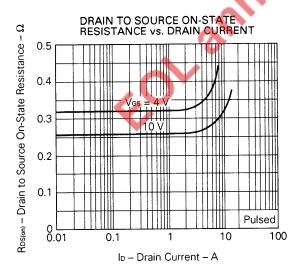


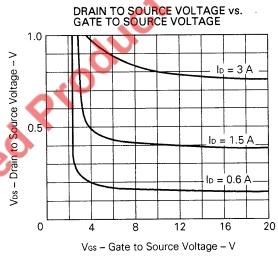


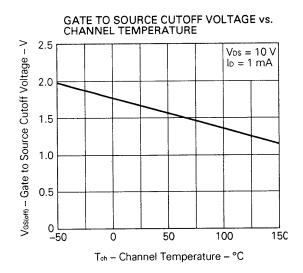
Data Sheet D17113EJ2V0DS 3



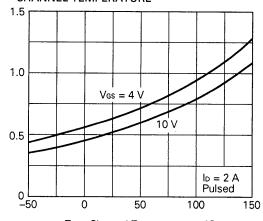




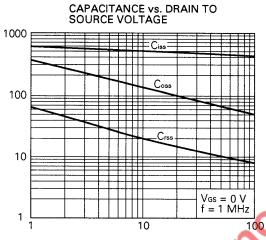




## DRAIN TO SOURCE ON-STATE RESISTANCE vs. CHANNEL TEMPERATURE

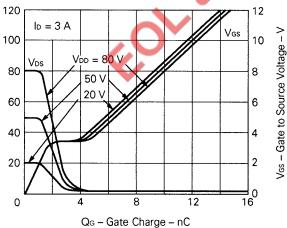


Tch - Channel Temperature - °C

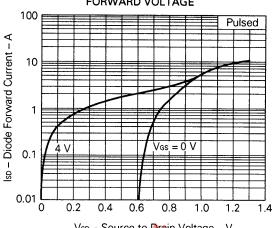


Vps - Drain to Source Voltage - V

### DYNAMIC INPUT CHARACTERISTICS

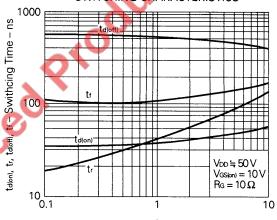


## SOURCE TO DRAIN DIODE FORWARD VOLTAGE



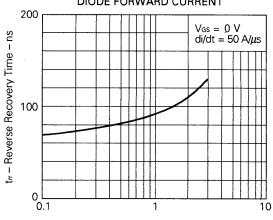
### Vsb - Source to Drain Voltage - V

### SWITCHING CHARACTERISTICS



lo - Drain Current - A

# REVERSE RECOVERY TIME vs. DIODE FORWARD CURRENT



IF - Diode Forward Current - A

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