

MOS FIELD EFFECT POWER TRANSISTORS

2SJ325, 2SJ325-Z

SWITCHING

P-CHANNEL POWER MOS FET

INDUSTRIAL USE

DESCRIPTION

The 2SJ325 is P-channel MOS Field Effect Transistor designed for solenoid, motor and lamp driver.

FEATURES

- Low On-state Resistance
 $R_{DS(on)} = 83 \text{ m}\Omega \text{ TYP. (} V_{GS} = -10 \text{ V, } I_D = -2 \text{ A)}$
 $R_{DS(on)} = 0.15 \Omega \text{ TYP. (} V_{GS} = -4 \text{ V, } I_D = -1.6 \text{ A)}$
- Low C_{iss} $C_{iss} = 800 \text{ pF TYP.}$
- Built-in G-S Gate Protection Diode

QUALITY GRADE

Standard

Please refer to "Quality grade on NEC Semiconductor Devices" (Document number IEI-1209) published by NEC Corporation to know the specification of quality grade on the devices and its recommended applications.

ABSOLUTE MAXIMUM RATINGS ($T_a = 25^\circ\text{C}$)

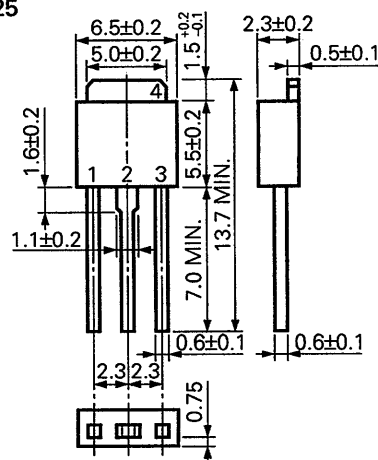
Drain to Source Voltage	V_{DSS}	-30	V
Gate to Source Voltage (AC)	V_{GSS}	± 20	V
Gate to Source Voltage (DC)	V_{GSS}	-20, +10	V
Drain Current (DC)	$I_D(\text{DC})$	± 4.0	A
Drain Current (pulse)	$I_D(\text{pulse})^*$	± 16	A
Total Power Dissipation ($T_c = 25^\circ\text{C}$)	P_{T1}	20	W
Total Power Dissipation ($T_a = 25^\circ\text{C}$)	P_{T2}	1.0	W
Channel Temperature	T_{ch}	150	$^\circ\text{C}$
Storage Temperature	T_{stg}	-55 to +150	$^\circ\text{C}$

* $PW \leq 10 \mu\text{s}$, Duty Cycle $\leq 1\%$

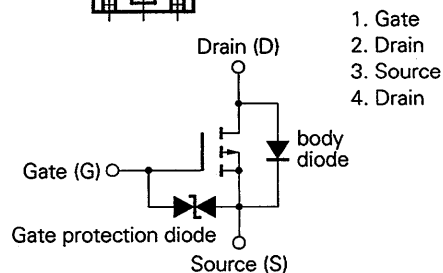
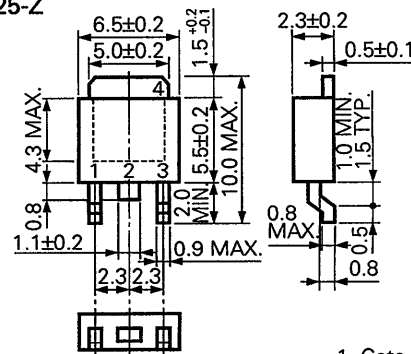
PACKAGE DIMENSIONS

in millimeters

2SJ325



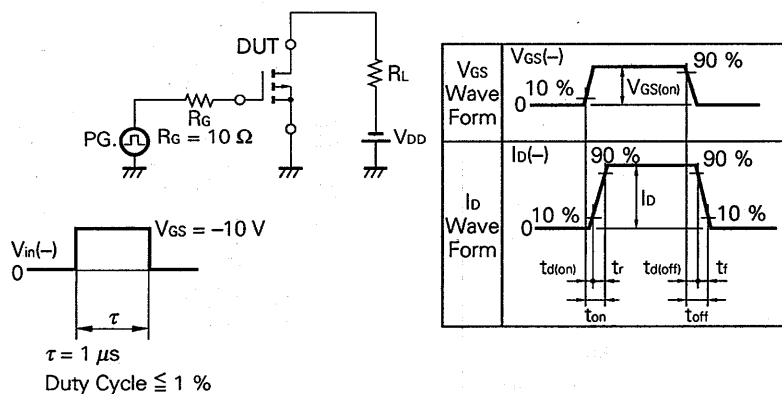
2SJ325-Z



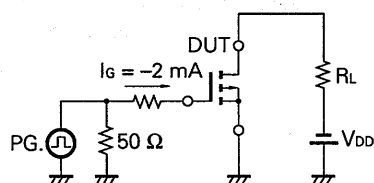
ELECTRICAL CHARACTERISTICS ($T_a = 25^\circ\text{C}$)

CHARACTERISTIC	SYMBOL	MIN.	TYP.	MAX.	UNIT	TEST CONDITIONS
Drain to Source On-state Resistance	$R_{DS(on)}$		0.08	0.11	Ω	$V_{GS} = -10\text{ V}$, $I_D = -2.0\text{ A}$
Drain to Source On-state Resistance	$R_{DS(on)}$		0.15	0.24	Ω	$V_{GS} = -4\text{ V}$, $I_D = -1.6\text{ A}$
Gate to Source Cutoff Voltage	$V_{GS(off)}$	-1.0	-1.5	-2.0	V	$V_{DS} = -10\text{ V}$, $I_D = -1\text{ mA}$
Forward Transfer Admittance	$ y_{fs} $	3.0	4.2		S	$V_{DS} = -10\text{ V}$, $I_D = -2.0\text{ A}$
Drain Leakage Current	I_{DSS}			-10	μA	$V_{DS} = -30\text{ V}$, $V_{GS} = 0$
Gate to Source Leakage Current	I_{GSS}			± 10	μA	$V_{GS} = \pm 16\text{ V}$, $V_{DS} = 0$
Input Capacitance	C_{iss}		800		pF	$V_{DS} = -10\text{ V}$ $V_{GS} = 0$ $f = 1\text{ MHz}$
Output Capacitance	C_{oss}		600		pF	
Reverse Transfer Capacitance	C_{rss}		250		pF	
Turn-On Delay Time	$t_{d(on)}$		15		ns	$V_{GS(on)} = -10\text{ V}$ $V_{DD} = -15\text{ V}$ $I_D = -2.0\text{ A}$, $R_G = 10\ \Omega$ $R_L = 7.5\ \Omega$
Rise Time	t_r		65		ns	
Turn-Off Delay Time	$t_{d(off)}$		85		ns	
Fall Time	t_f		60		ns	
Total Gate Charge	Q_G		28		nC	$V_{GS} = -10\text{ V}$ $I_D = -4.0\text{ A}$ $V_{DD} = -24\text{ V}$
Gate to Source Charge	Q_{GS}		3		nC	
Gate to Drain Charge	Q_{GD}		11		nC	
Body Diode Forward Voltage	V_F		0.9		V	$I_F = 4.0\text{ A}$, $V_{GS} = 0$
Reverse Recovery Time	t_{rr}		65		ns	$I_F = 4.0\text{ A}$, $V_{GS} = 0$ $di/dt = 50\text{ A}/\mu\text{s}$
Reverse Recovery Charge	Q_{rr}		60		nC	

Test Circuit 1: Switching Time

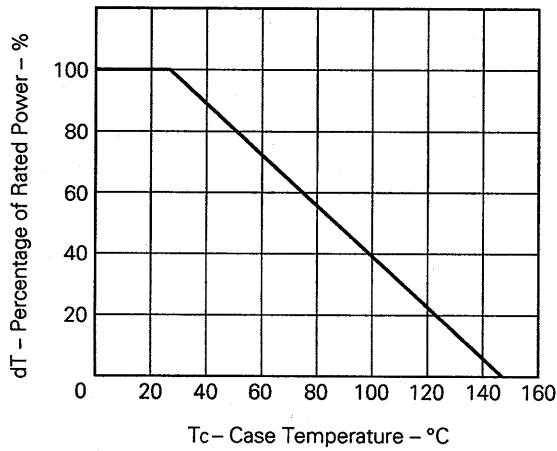


Test Circuit 2: Gate Charge

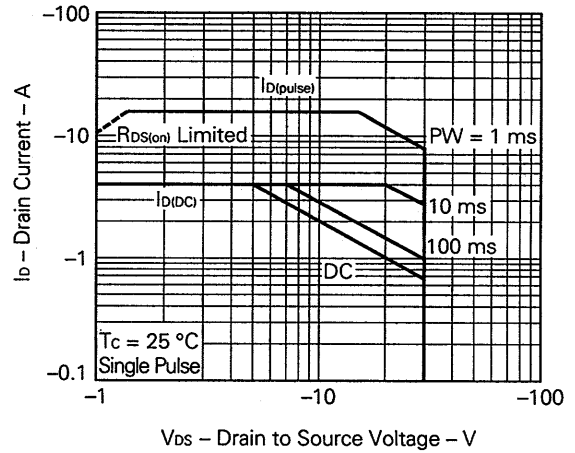


TYPICAL CHARACTERISTICS ($T_a = 25^\circ\text{C}$)

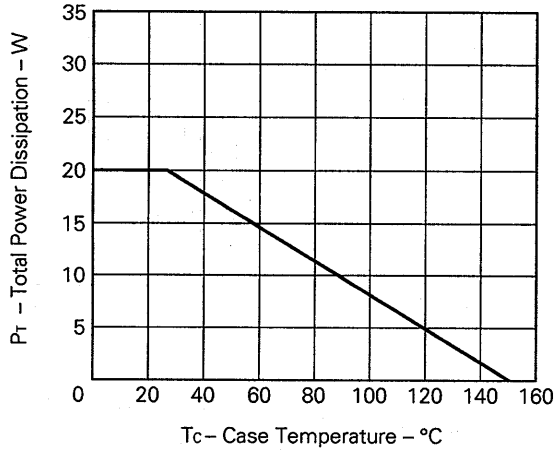
DERATING FACTOR OF FORWARD BIAS
SAFE OPERATING AREA



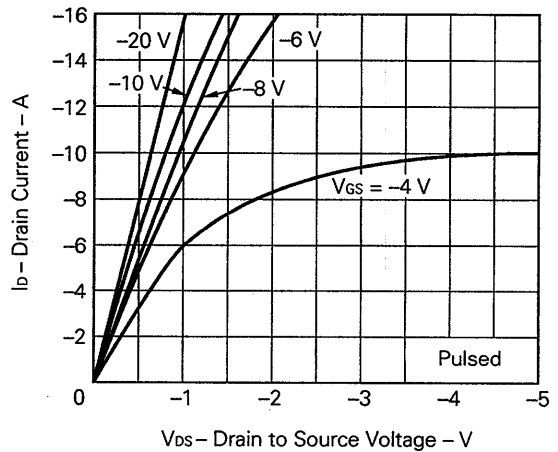
FORWARD BIAS SAFE OPERATING AREA



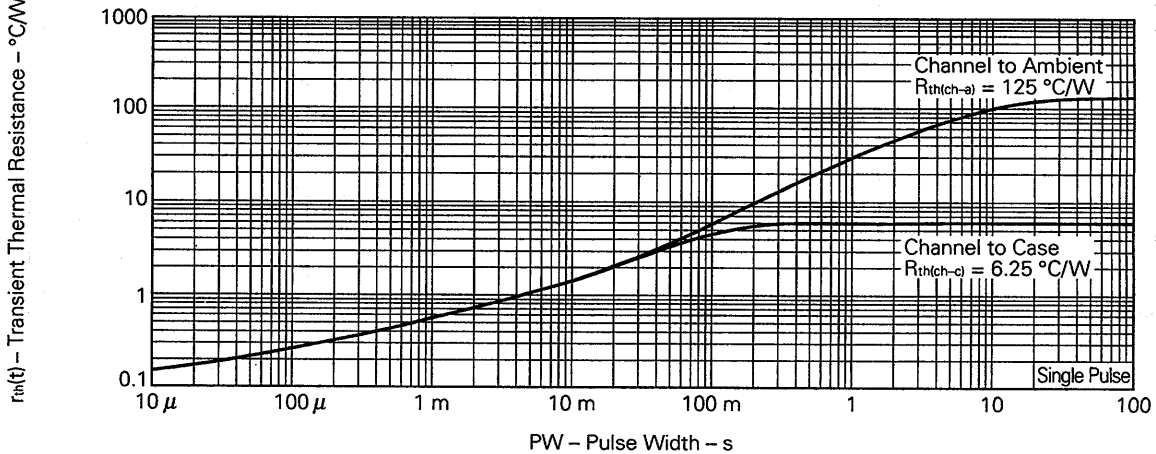
TOTAL POWER DISSIPATION vs.
CASE TEMPERATURE



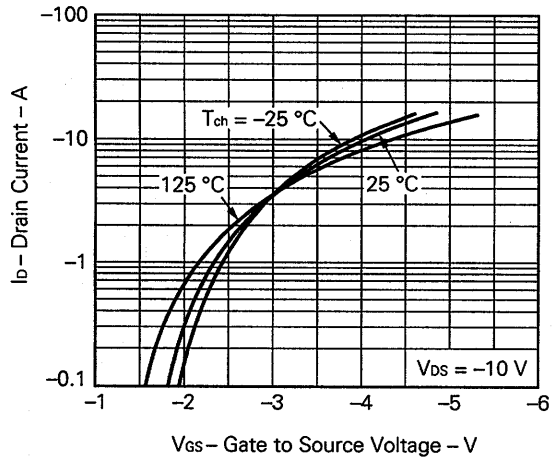
DRAIN CURRENT vs.
DRAIN TO SOURCE VOLTAGE



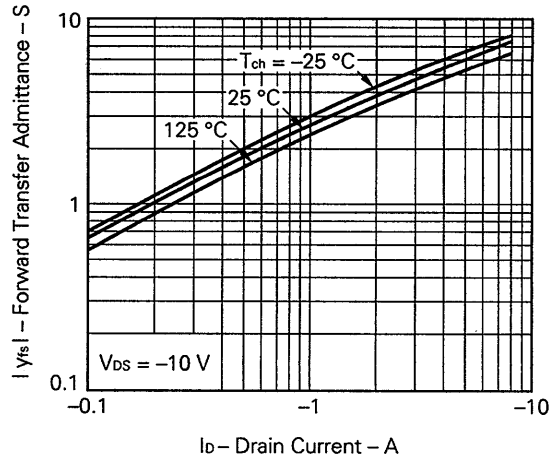
TRANSIENT THERMAL RESISTANCE vs. PULSE WIDTH



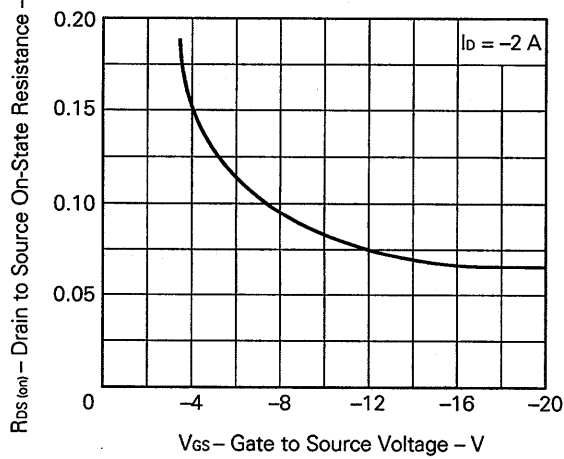
TRANSFER CHARACTERISTICS



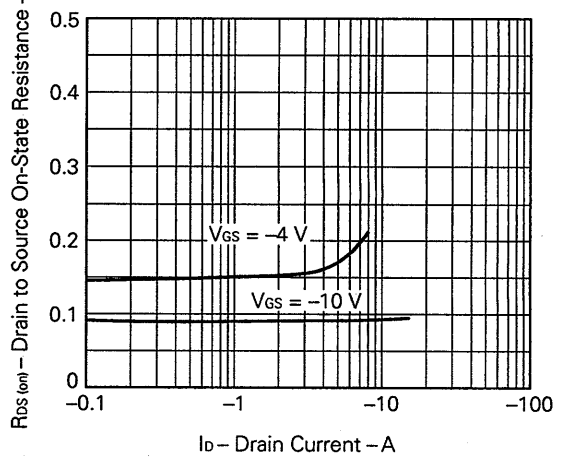
FORWARD TRANSFER ADMITTANCE vs. DRAIN CURRENT



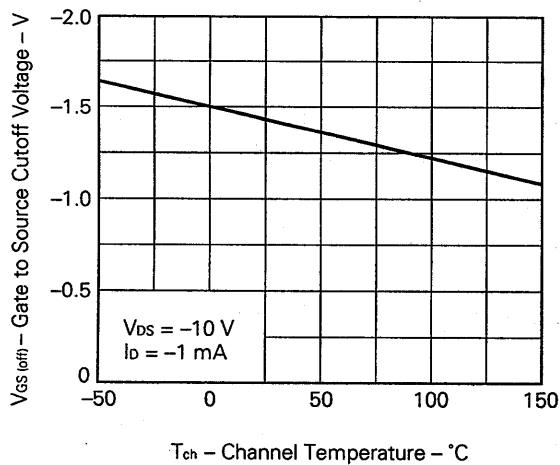
DRAIN TO SOURCE ON-STATE RESISTANCE vs. GATE TO SOURCE VOLTAGE



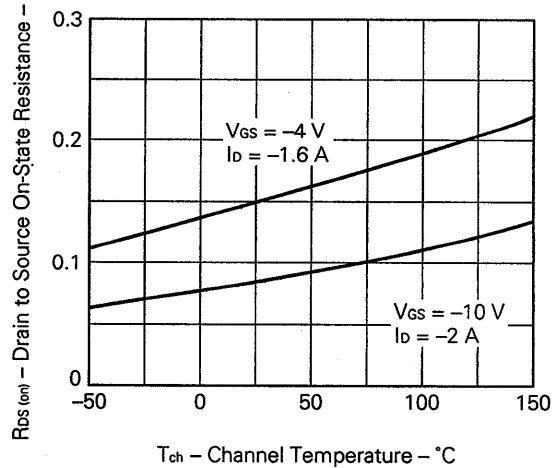
DRAIN TO SOURCE ON-STATE RESISTANCE vs. DRAIN CURRENT

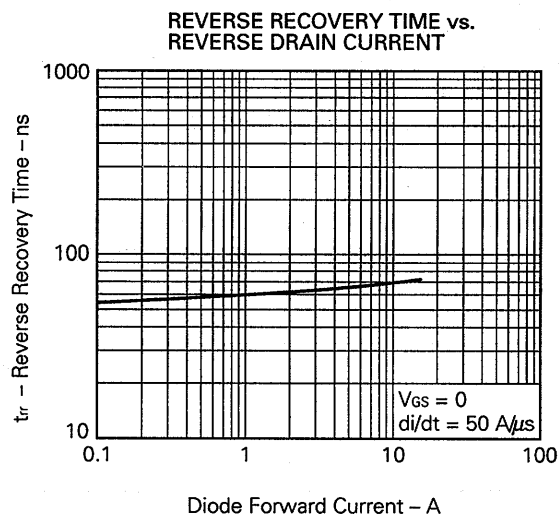
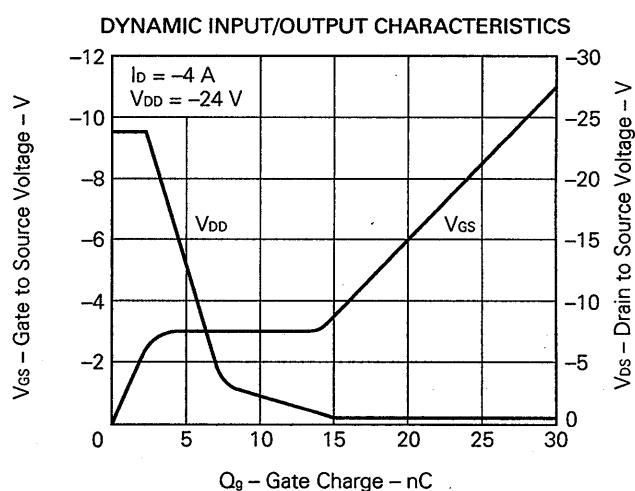
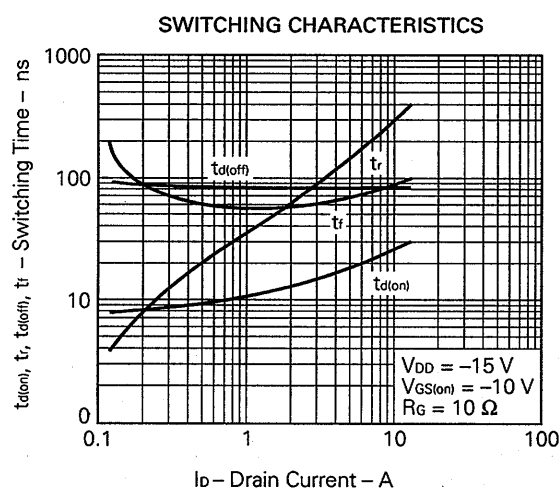
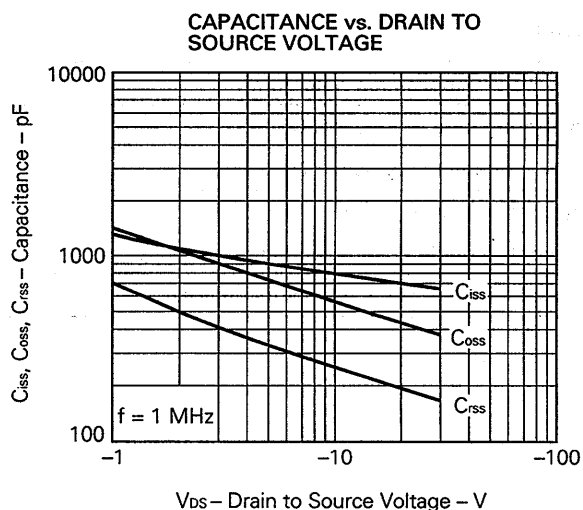
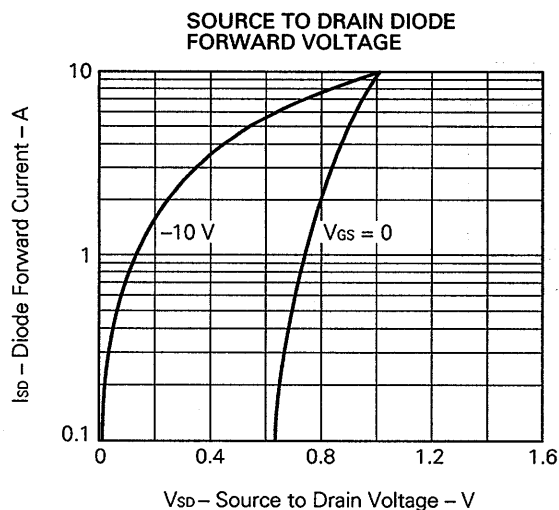


GATE TO SOURCE CUTOFF VOLTAGE vs. CHANNEL TEMPERATURE



DRAIN TO SOURCE ON-STATE RESISTANCE vs. CHANNEL TEMPERATURE





Reference

Application note name	No.
Safe operating area of Power MOS FET.	TEA-1034
Application circuit using Power MOS FET.	TEA-1035
Quality control of NEC semiconductors devices.	TEI-1202
Quality control guide of semiconductors devices.	MEI-1202
Assembly manual of semiconductors devices.	IEI-1207

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