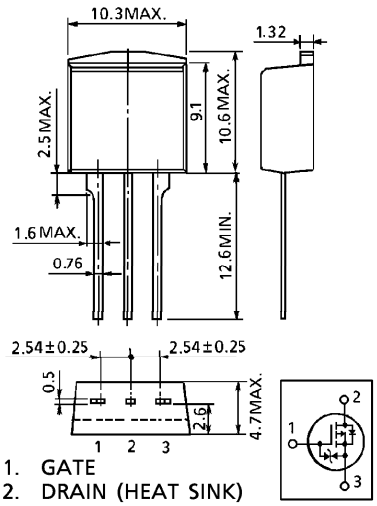
TOSHIBA FIELD EFFECT TRANSISTOR SILICON P CHANNEL MOS TYPE (L^2-π-MOSV)

2SJ412

DC-DC CONVERTER, RELAY DRIVE AND MOTOR DRIVE APPLICATIONS

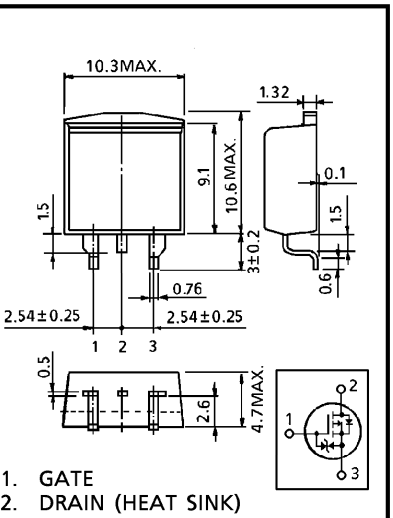
- 4 V Gate Drive
- Low Drain-Source ON Resistance : $R_{DS\,(ON)}$ = 0.15 Ω (Typ.)
- High Forward Transfer Admittance : $|Y_{fs}|$ = 7.7 S (Typ.)
- Low Leakage Current : I_{DSS} = −100 μA (Max.) (V_{DS} = −100 V)
- Enhancement-Mode : V_{th} = −0.8~−2.0 V (V_{DS} = −10 V, I_D = −1 mA)

Unit in mm



JEDEC	—
JEITA	—
TOSHIBA	2-10S1B

Weight : 1.5 g (Typ.)



JEDEC	—
JEITA	—
TOSHIBA	2-10S2B

Weight : 1.5 g (Typ.)

MAXIMUM RATINGS (Ta = 25°C)

CHARACTERISTIC		SYMBOL	RATING	UNIT
Drain-Source Voltage		V_{DSS}	−100	V
Drain-Gate Voltage (R_{GS} = 20 kΩ)		V_{DGR}	−100	V
Gate-Source Voltage		V_{GSS}	±20	V
Drain Current	DC (Note 1)	I_D	−16	A
	Pulse (Note 1)	I_{DP}	−64	A
Drain Power Dissipation (Tc = 25°C)		P_D	60	W
Single Pulse Avalanche Energy (Note 2)		E_{AS}	292	mJ
Avalanche Current		I_{AR}	−16	A
Repetitive Avalanche Energy (Note 3)		E_{AR}	6	mJ
Channel Temperature		T_{ch}	150	°C
Storage Temperature Range		T_{stg}	−55~150	°C

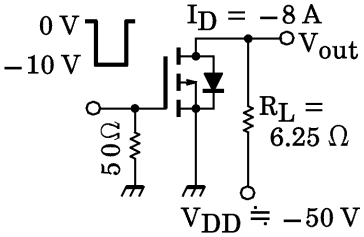
THERMAL CHARACTERISTICS

CHARACTERISTIC	SYMBOL	MAX.	UNIT
Thermal Resistance, Channel to Case	$R_{th\,(ch\text{-}c)}$	2.08	°C / W
Thermal Resistance, Channel to Ambient	$R_{th\,(ch\text{-}a)}$	83.3	°C / W

(Note 1) : Please use devices on condition that the channel temperature is below 150°C.
(Note 2) : V_{DD} = −25 V, T_{ch} = 25°C (initial), L = 1.84 mH, R_G = 25 Ω, I_{AR} = −16 A
(Note 3) : Repetitive rating ; Pulse Width Limited by maximum junction temperature.

This transistor is an electrostatic sensitive device. Please handle with caution.

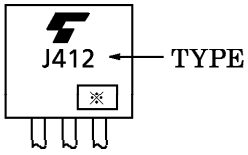
ELECTRICAL CHARACTERISTICS (Ta = 25°C)

CHARACTERISTIC		SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Gate Leakage Current		I_{GSS}	V_{GS} = ±16 V, V_{DS} = 0 V	—	—	±10	μA
Drain Cut-off Current		I_{DSS}	V_{DS} = −100 V, V_{GS} = 0 V	—	—	−100	μA
Drain-Source Breakdown Voltage		$V_{(BR)\,DSS}$	I_D = −10 mA, V_{GS} = 0 V	−100	—	—	V
Gate Threshold Voltage		V_{th}	V_{DS} = −10 V, I_D = −1 mA	−0.8	—	−2.0	V
Drain-Source ON Resistance		$R_{DS\,(ON)}$	V_{GS} = −4 V, I_D = −6 A	—	0.25	0.32	Ω
			V_{GS} = −10 V, I_D = −6 A	—	0.15	0.21	
Forward Transfer Admittance		$\|Y_{fs}\|$	V_{DS} = −10 V, I_D = −6 A	4.5	7.7	—	S
Input Capacitance		C_{iss}	V_{DS} = −10 V, V_{GS} = 0 V, f = 1MHz	—	1100	—	pF
Reverse Transfer Capacitance		C_{rss}		—	210	—	
Output Capacitance		C_{oss}		—	440	—	
Switching Time	Rise Time	t_r		—	18	—	ns
	Turn-on Time	t_{on}		—	30	—	
	Fall Time	t_f		—	18	—	
	Turn-off Time	t_{off}	Duty ≦ 1%, t_w = 10 μs	—	65	—	
Total Gate Charge (Gate-Source Plus Gate-Drain)		Q_g	V_{DD} ≒ −80 V, V_{GS} = −10 V, I_D = −16 A	—	48	—	nC
Gate-Source Charge		Q_{gs}		—	29	—	
Gate-Drain ("Miller") Charge		Q_{gd}		—	19	—	

SOURCE-DRAIN RATINGS AND CHARACTERISTICS (Ta = 25°C)

CHARACTERISTIC	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Continuous Drain Reverse Current (Note 1)	I_{DR}	—	—	—	−16	A
Pulse Drain Reverse Current (Note 1)	I_{DRP}	—	—	—	−64	A
Forward Voltage (Diode)	V_{DSF}	I_{DR} = −16 A, V_{GS} = 0 V	—	—	1.7	V
Reverse Recovery Time	t_{rr}	I_{DR} = −16 A, V_{GS} = 0 V, dI_{DR}/dt = 50 A/μs	—	160	—	ns
Reverse Recovery Charge	Q_{rr}		—	0.5	—	μC

MARKING

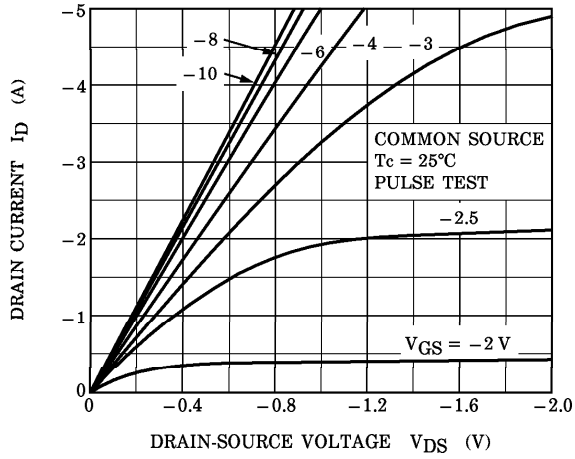


※ Lot Number

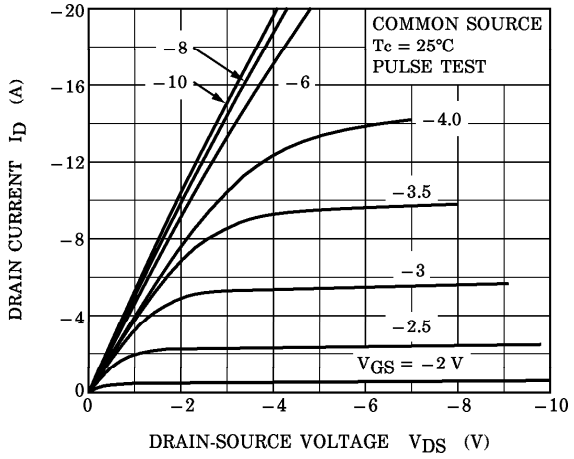
□□ — Month (Starting from Alphabet A)

Year (Last Number of the Christian Era)

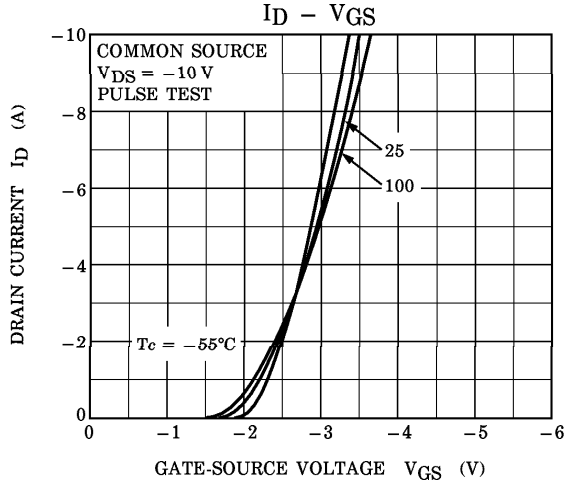
$I_D - V_{DS}$



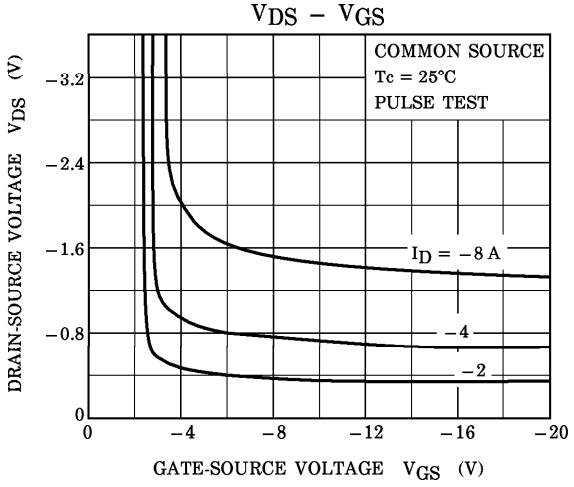
$I_D - V_{DS}$



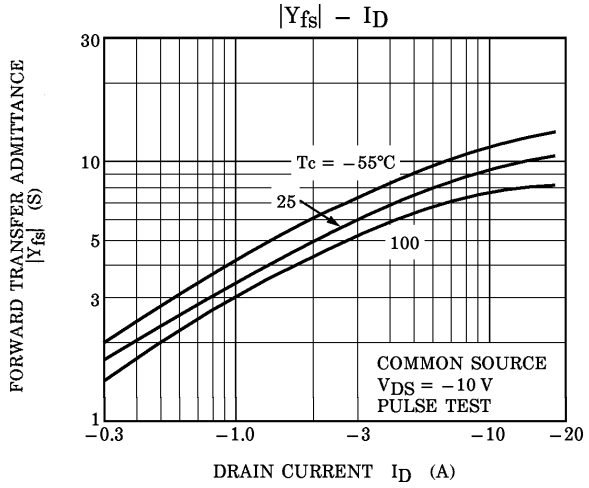
$I_D - V_{GS}$



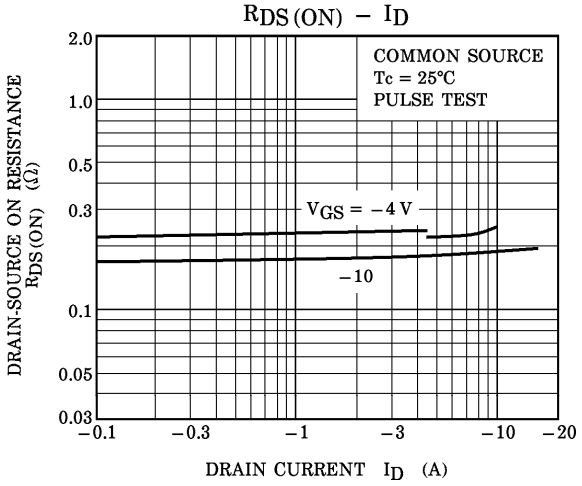
$V_{DS} - V_{GS}$



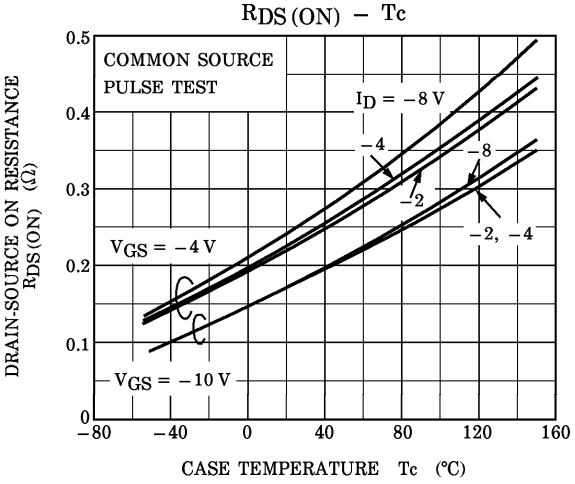
$|Y_{fs}| - I_D$



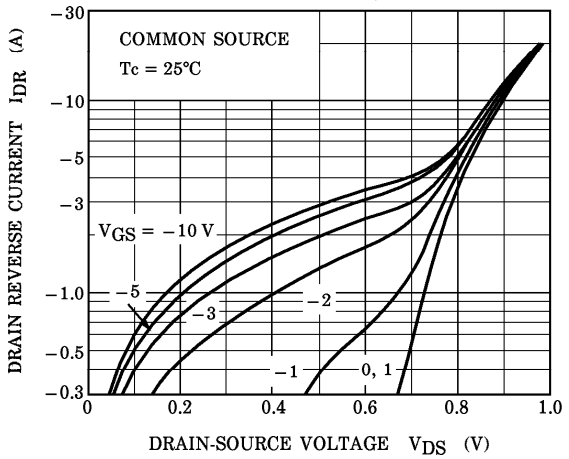
$R_{DS\,(ON)} - I_D$



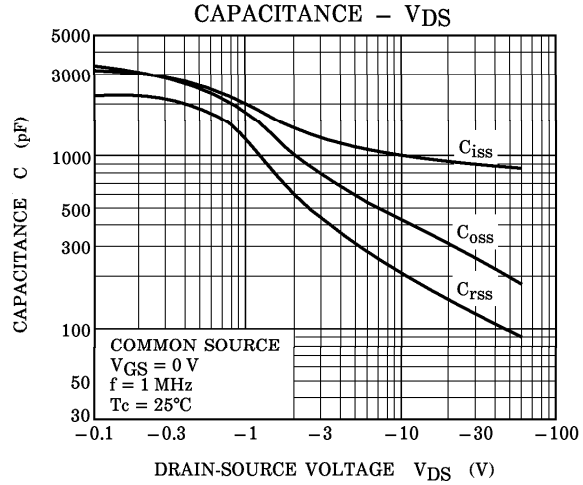
$R_{DS\,(ON)}$ – Tc



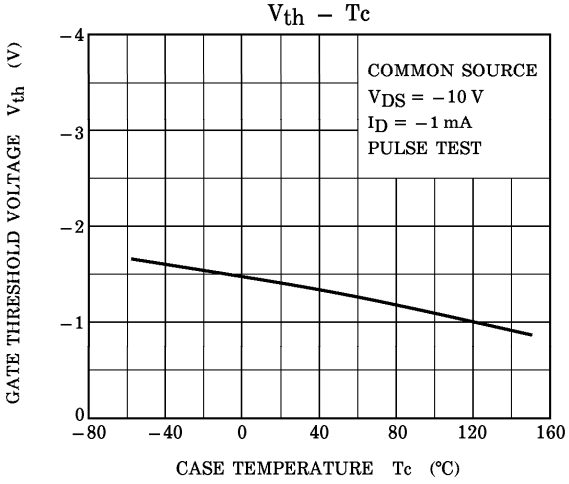
I_{DR} – V_{DS}



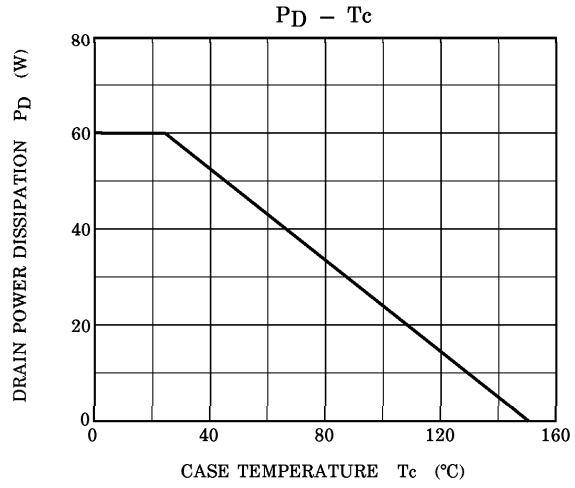
CAPACITANCE – V_{DS}



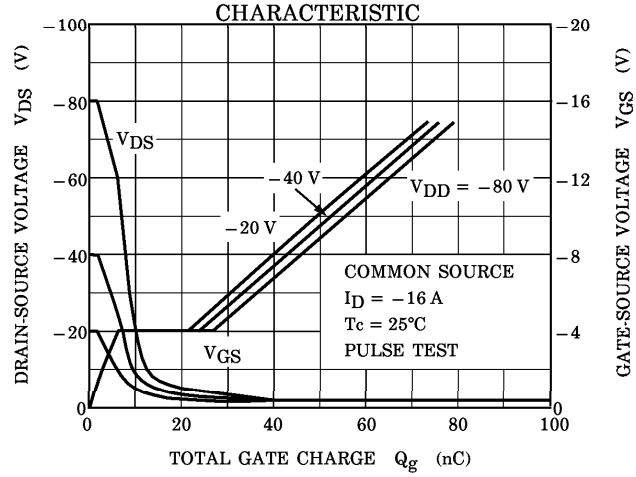
V_{th} – Tc



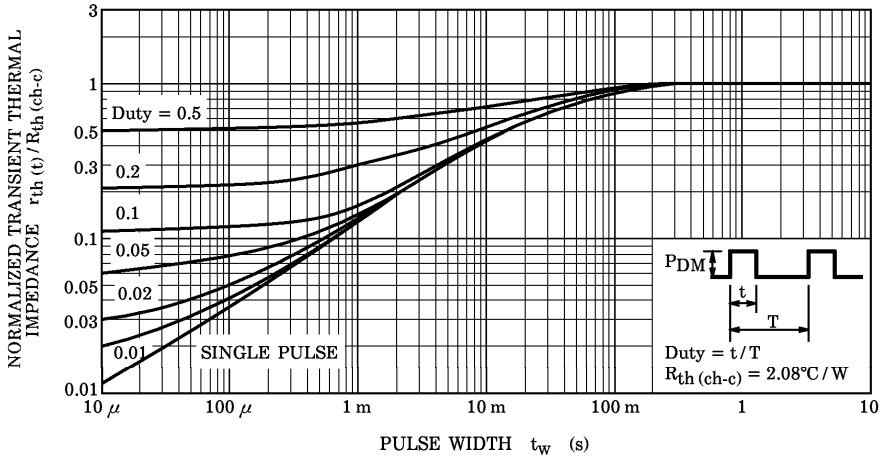
P_D – Tc



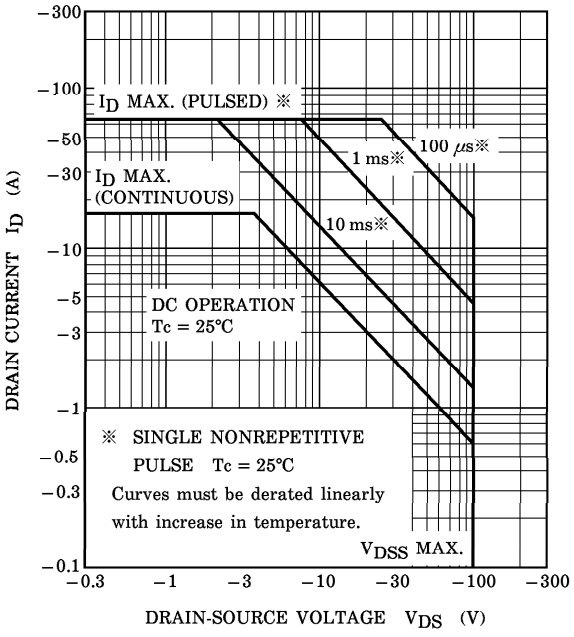
DYNAMIC INPUT / OUTPUT CHARACTERISTIC



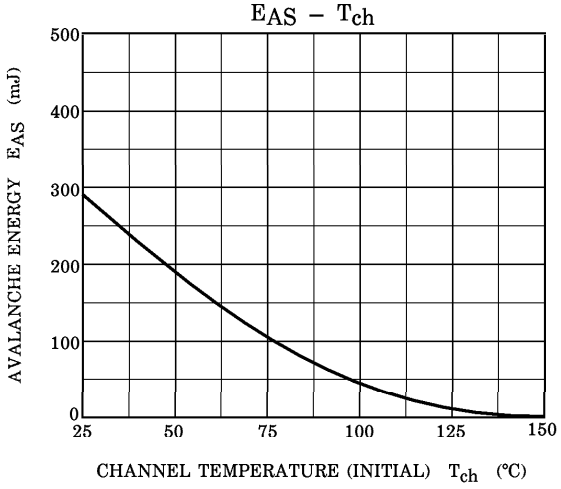
r_{th} – t_w

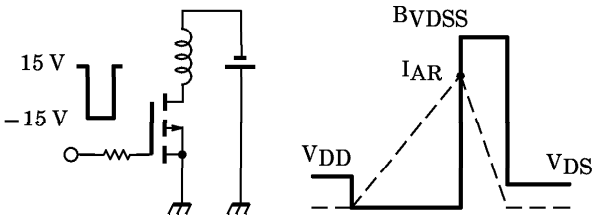


SAFE OPERATING AREA



E_{AS} – T_{ch}





TEST CIRCUIT WAVE FORM

$R_G = 25\Omega$
$V_{DD} = -25$ V, L = 1.84 mH

$$E_{AS} = \frac{1}{2} \cdot L \cdot I^2 \cdot \left(\frac{B_{VDSS}}{B_{VDSS} - V_{DD}} \right)$$

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