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

2SJ380

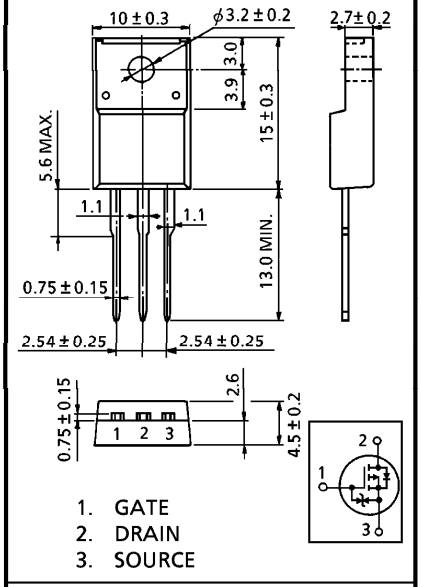
HIGH SPEED, HIGH CURRENT SWITCHING APPLICATIONS

RELAY DRIVE, DC-DC CONVERTER AND MOTOR DRIVE APPLICATIONS

INDUSTRIAL APPLICATIONS

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

Unit in mm



JEDEC	—
EIAJ	SC-67
TOSHIBA	2-10R1B

Weight : 1.9 g

MAXIMUM RATINGS (Ta = 25°C)

CHARACTERISTIC		SYMBOL	RATING	UNIT
Drain-Source Voltage		V_{DSS}	−100	V
Drain-Gate Voltage ($R_{GS} = 20\ k\Omega$)		V_{DGR}	−100	V
Gate-Source Voltage		V_{GSS}	±20	V
Drain Current	DC	I_D	−12	A
	Pulse	I_{DP}	−48	A
Drain Power Dissipation (Tc = 25°C)		P_D	35	W
Single Pulse Avalanche Energy**		E_{AS}	312	mJ
Avalanche Current		I_{AR}	−12	A
Repetitive Avalanche Energy*		E_{AR}	3.5	mJ
Channel Temperature		T_{ch}	150	°C
Storage Temperature Range		T_{stg}	−55~150	°C

000707EAA1

THERMAL CHARACTERISTICS

CHARACTERISTIC	SYMBOL	MAX.	UNIT
Thermal Resistance, Channel to Case	$R_{th\ (ch\text{-}c)}$	3.57	°C / W
Thermal Resistance, Channel to Ambient	$R_{th\ (ch\text{-}a)}$	62.5	°C / W

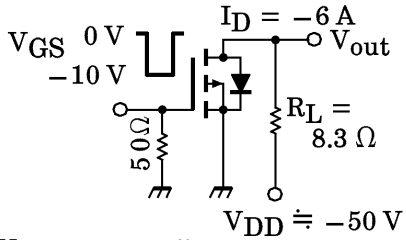
Note ;

* Repetitive rating ; Pulse Width Limited by Max. junction temperature.

** $V_{DD} = -25$ V, $T_{ch} = 25$°C (initial), L = 2.94 mH, $R_G = 25\ \Omega$, $I_{AR} = -12$ A

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

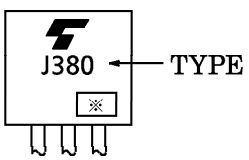
ELECTRICAL CHARACTERISTICS (Ta = 25°C)

CHARACTERISTIC		SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Gate Leakage Current		I_{GSS}	$V_{GS} = \pm 16$ 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 = 1 MHz	—	1100	—	pF
Reverse Transfer Capacitance		C_{rss}		—	200	—	
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}	V_{IN} : t_r, $t_f < 5$ ns, Duty ≦ 1%, $t_w = 10$ μs	—	65	—	
Total Gate Charge (Gate-Source Plus Gate-Drain)		Q_g	$V_{DD} \fallingdotseq -80$ V, $V_{GS} = -10$ V, $I_D = -12$ A	—	48	—	nC
Gate-Source Charge		Q_{gs}		—	29	—	
Gate-Drain ("Miller") Charge		Q_{gd}		—	19	—	

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

CHARACTERISTIC	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Continuous Drain Reverse Current	I_{DR}	—	—	—	−12	A
Pulse Drain Reverse Current	I_{DRP}	—	—	—	−48	A
Diode Forward Voltage	V_{DSF}	$I_{DR} = -12$ A, $V_{GS} = 0$ V	—	—	1.7	V
Reverse Recovery Time	t_{rr}	$I_{DR} = -12$ A, $V_{GS} = 0$ V, $dI_{DR}/dt = 50$ A/μs	—	160	—	ns
Reverse Recovery Charge	Q_{rr}		—	0.5	—	μC

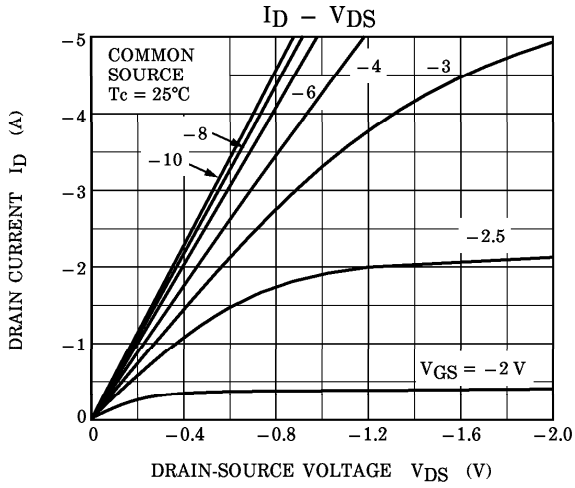
MARKING

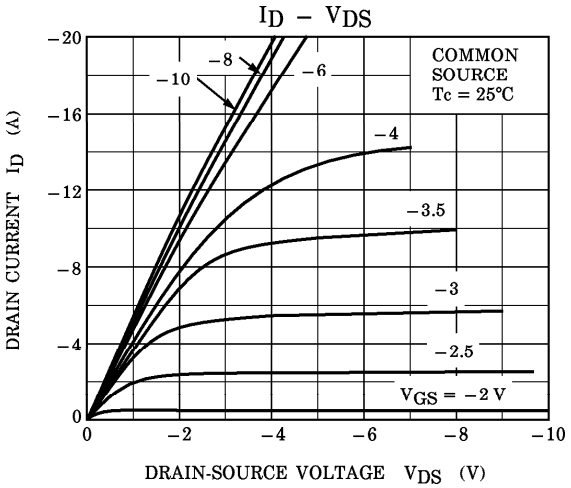


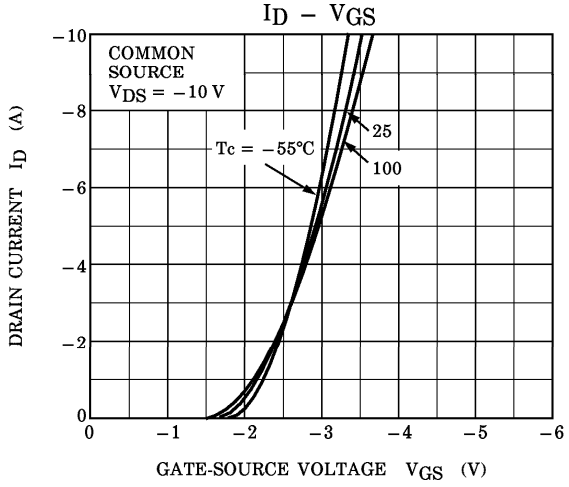
※ Lot Number

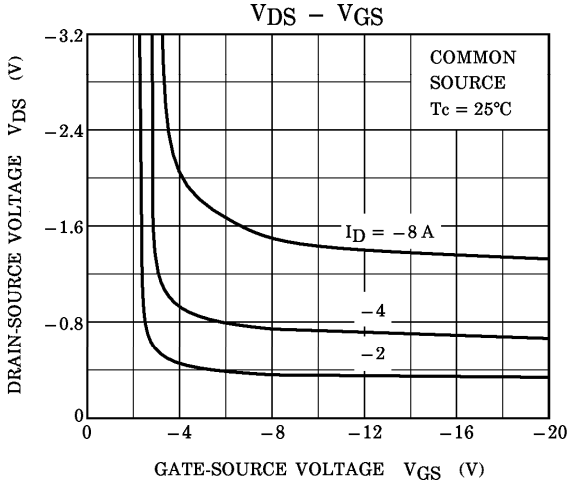
□□ — Month (Starting from Alphabet A)

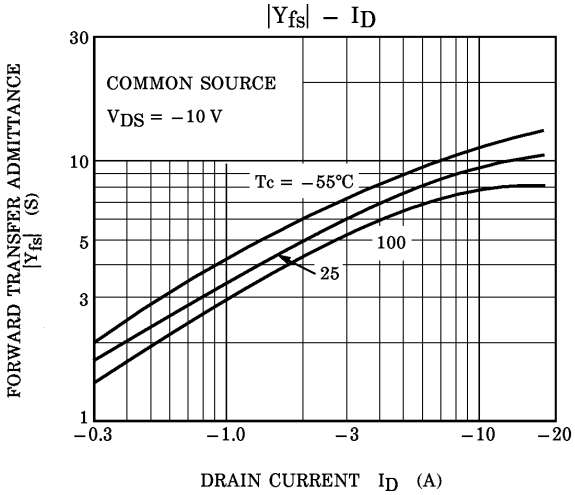
— Year (Last Number of the Christian Era)

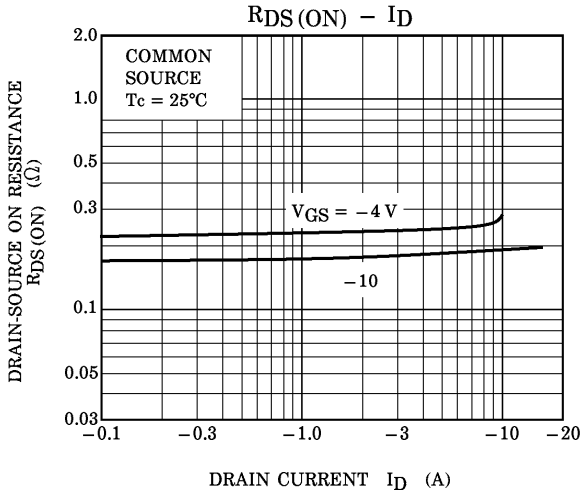

I_D – V_{DS}
COMMON SOURCE
Tc = 25°C
−4
−3
−6
−8
−10
−2.5
V_{GS} = −2 V
DRAIN CURRENT I_D (A)
DRAIN-SOURCE VOLTAGE V_{DS} (V)
0
−0.4
−0.8
−1.2
−1.6
−2.0
−1
−2
−3
−4
−5


I_D – V_{DS}
COMMON SOURCE
Tc = 25°C
−8
−10
−6
−4
−3.5
−3
−2.5
V_{GS} = −2 V
DRAIN CURRENT I_D (A)
DRAIN-SOURCE VOLTAGE V_{DS} (V)
0
−2
−4
−6
−8
−10
−12
−16
−20

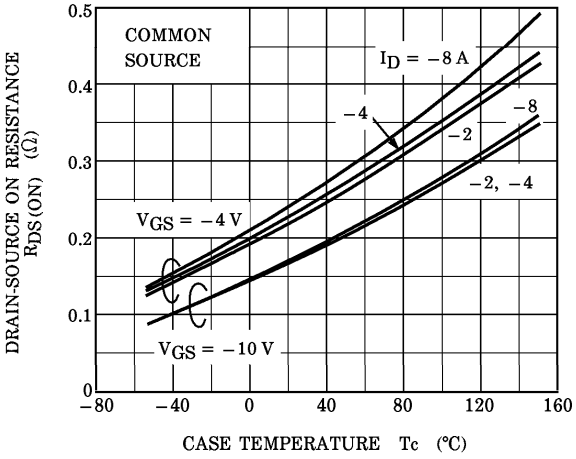

I_D – V_{GS}
COMMON SOURCE
V_{DS} = −10 V
Tc = −55°C
25
100
DRAIN CURRENT I_D (A)
GATE-SOURCE VOLTAGE V_{GS} (V)
0
−1
−2
−3
−4
−5
−6
−2
−4
−6
−8
−10


V_{DS} – V_{GS}
COMMON SOURCE
Tc = 25°C
I_D = −8 A
−4
−2
DRAIN-SOURCE VOLTAGE V_{DS} (V)
GATE-SOURCE VOLTAGE V_{GS} (V)
0
−4
−8
−12
−16
−20
−0.8
−1.6
−2.4
−3.2

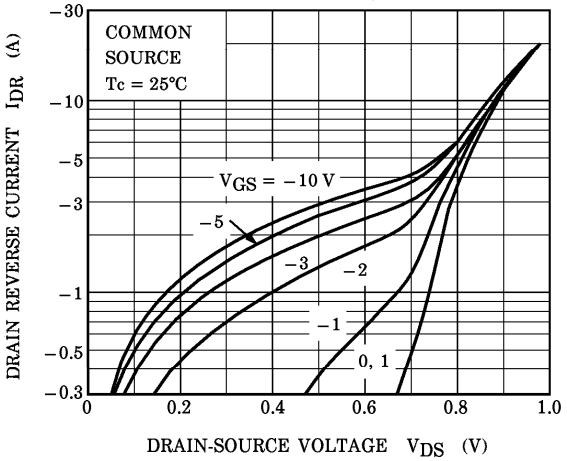

$|Y_{fs}|$ – I_D
COMMON SOURCE
V_{DS} = −10 V
Tc = −55°C
100
25
FORWARD TRANSFER ADMITTANCE $|Y_{fs}|$ (S)
DRAIN CURRENT I_D (A)
30
10
5
3
1
−0.3
−1.0
−3
−10
−20


$R_{DS\,(ON)}$ – I_D
COMMON SOURCE
Tc = 25°C
V_{GS} = −4 V
−10
DRAIN-SOURCE ON RESISTANCE $R_{DS\,(ON)}$ (Ω)
DRAIN CURRENT I_D (A)
2.0
1.0
0.5
0.3
0.1
0.05
0.03
−0.1
−0.3
−1.0
−3
−10
−20

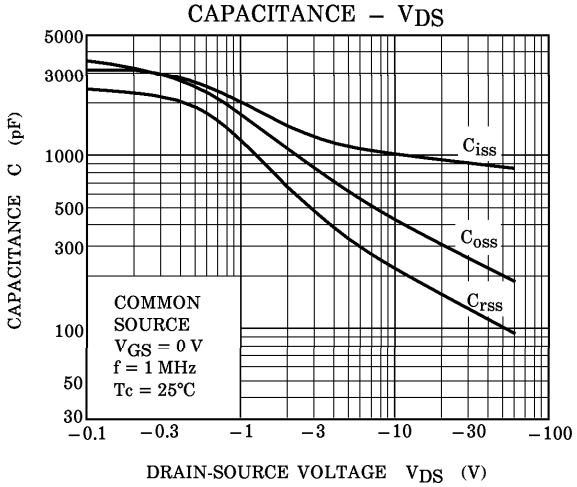
$R_{DS(ON)}$ – Tc



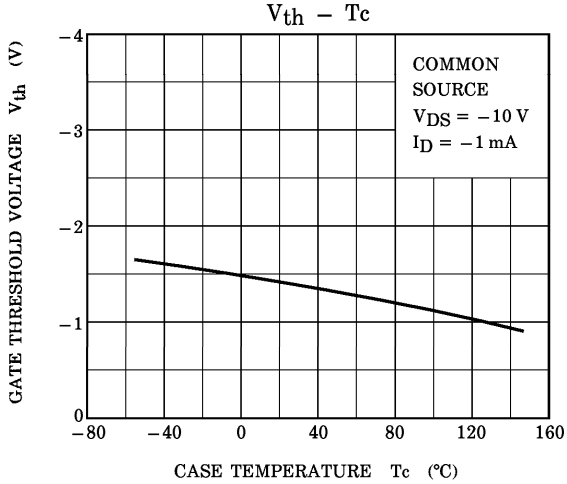
I_{DR} – V_{DS}



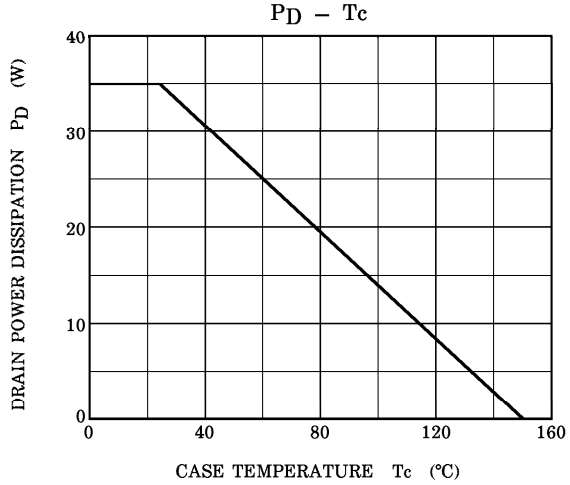
CAPACITANCE – V_{DS}



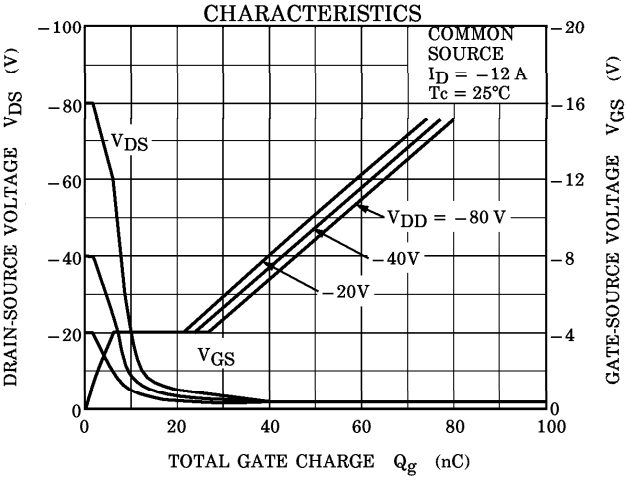
V_{th} – Tc



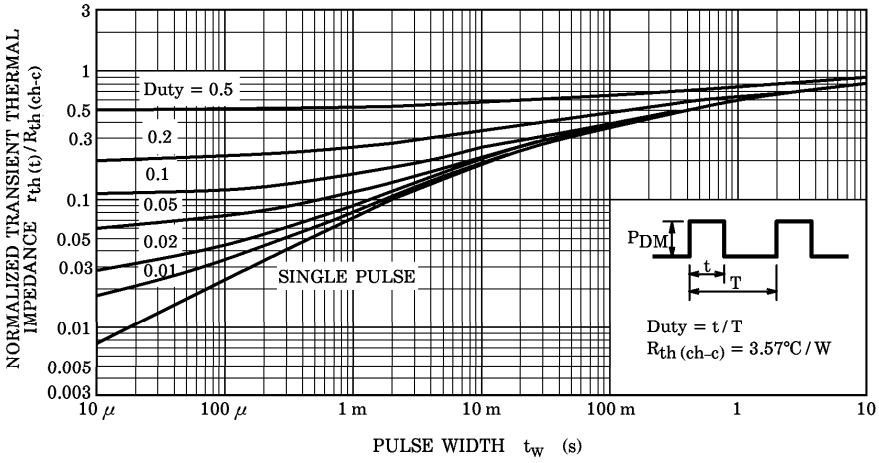
P_D – Tc



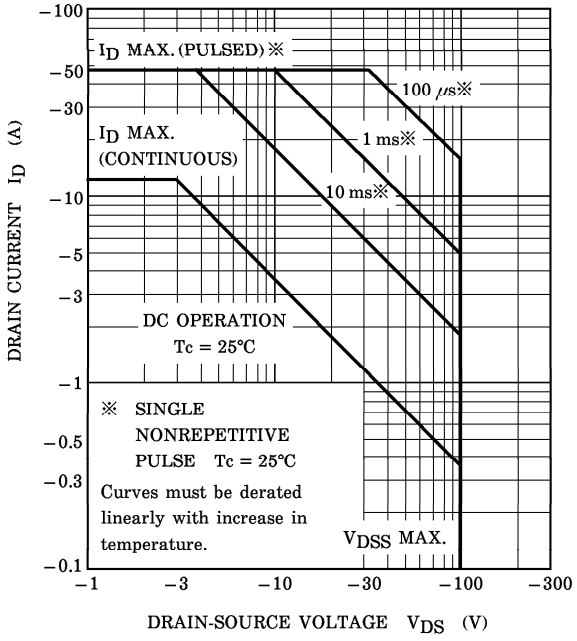
DYNAMIC INPUT / OUTPUT CHARACTERISTICS



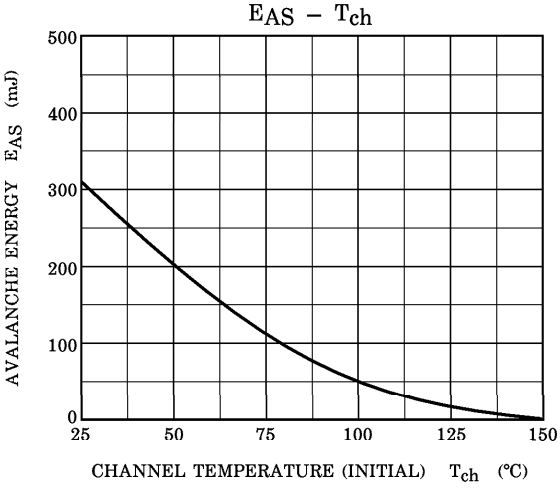
r_{th} – t_w

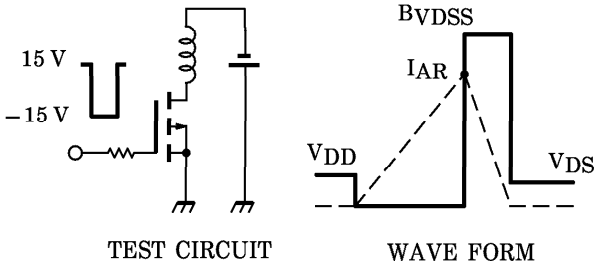


SAFE OPERATING AREA



E_{AS} – T_{ch}





Peak I_{AR} = −12 A, R_G = 25 Ω
V_{DD} = −25 V, L = 2.94 mH

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