

TOSHIBA FIELD EFFECT TRANSISTOR SILICON N CHANNEL MOS TYPE ( $\pi$ -MOSV)

## YTA640

HIGH SPEED, HIGH VOLTAGE SWITCHING APPLICATIONS  
 SWITCHING REGULATOR, DC-DC CONVERTER AND MOTOR DRIVE APPLICATIONS

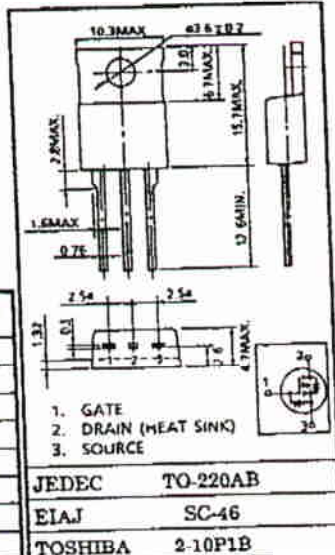
INDUSTRIAL APPLICATIONS

Unit in mm

- Low Drain-Source ON Resistance :  $R_{DS(ON)} = 0.13\Omega$  (Typ.)
- High Forward Transfer Admittance :  $|Y_{fs}| = 17S$  (Typ.)
- Low Leakage Current :  $I_{DSS} = 100\mu A$  (Max.) ( $V_{DS} = 200V$ )
- Enhancement-Mode :  $V_{th} = 1.5 \sim 3.5V$  ( $V_{DS} = 10V$ ,  $I_D = 1mA$ )

MAXIMUM RATINGS ( $T_a = 25^\circ C$ )

CHARACTERISTIC	SYMBOL	RATING	UNIT
Drain-Source Voltage	$V_{DS}$	200	V
Drain-Gate Voltage ( $R_{GS} = 20k\Omega$ )	$V_{DGR}$	200	V
Gate-Source Voltage	$V_{GSS}$	$\pm 20$	V
Drain Current	DC	$I_D$	15 A
	Pulse	$I_{DP}$	45 A
Drain Power Dissipation ( $T_c = 25^\circ C$ )	$P_D$	80	W
Single Pulse Avalanche Energy**	$E_{AS}$	166	mJ
Avalanche Current	$I_{AR}$	15	A
Repetitive Avalanche Energy**	$E_{AR}$	8.0	mJ
Channel Temperature	$T_{ch}$	150	$^\circ C$
Storage Temperature Range	$T_{stg}$	$-55 \sim 150$	$^\circ C$



Weight : 2.0g

## THERMAL CHARACTERISTICS

CHARACTERISTIC	SYMBOL	MAX.	UNIT
Thermal Resistance, Channel To Case	$R_{th(ch-c)}$	1.56	$^\circ C/W$
Thermal Resistance, Channel To Ambient	$R_{th(ch-a)}$	83.3	$^\circ C/W$

Note :

- Repetitive rating ; Pulse Width Limited by Max. junction temperature.
- \*\*  $V_{DD} = 50V$ ,  $T_{ch} = 25^\circ C$ ,  $L = 1.2mH$ ,  $R_G = 25\Omega$ ,  $I_{AR} = 15A$

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

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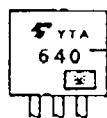
## ELECTRICAL CHARACTERISTICS (Ta=25°C)

CHARACTERISTIC		SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Gate Leakage Current		$I_{GSS}$	$V_{GS} = \pm 16V, V_{DS} = 0V$	—	—	$\pm 10$	$\mu A$
Drain Cut-off Current		$I_{DSS}$	$V_{DS} = 200V, V_{GS} = 0V$	—	—	100	$\mu A$
Drain-Source Breakdown Voltage		$V_{(BR)DSS}$	$I_D = 10mA, V_{GS} = 0V$	200	—	—	V
Gate Threshold Voltage		$V_{th}$	$V_{DS} = 10V, I_D = 1mA$	1.5	—	3.5	V
Drain-Source ON Resistance		$R_{DS(ON)}$	$V_{GS} = 10V, I_D = 10A$	—	0.13	0.18	$\Omega$
Forward Transfer Admittance		$ Y_{fs} $	$V_{DS} = 10V, I_D = 10A$	10	17	—	S
Input Capacitance		$C_{iss}$	$V_{DS} = 10V, V_{GS} = 0V, f = 1MHz$	—	2000	—	pF
Reverse Transfer Capacitance		$C_{riss}$		—	200	—	
Output Capacitance		$C_{oss}$		—	600	—	
Switching Time	Rise Time	$t_r$		—	35	—	ns
	Turn-on Time	$t_{on}$		—	50	—	
	Fall Time	$t_f$		—	10	—	
	Turn-off Time	$t_{off}$		$V_{IN} : t_r, t_f < 5ns, \text{Duty} \leq 1\%, t_w = 10\mu s$	—	66	
Total Gate Charge (Gate-Source Plus Gate-Drain)		$Q_g$	$V_{DD} = 100V, V_{GS} = 10V$	—	40	—	nC
Gate-Source Charge		$Q_{gs}$	$I_D = 15A$	—	25	—	
Gate-Drain ("Miller") Charge		$Q_{gd}$		—	15	—	

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

CHARACTERISTIC	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Continuous Drain Reverse Current	$I_{DR}$	—	—	—	15	A
Pulse Drain Reverse Current	$I_{DRP}$	—	—	—	45	A
Diode Forward Voltage	$V_{DSF}$	$I_{DR} = 15A, V_{GS} = 0V$	—	—	-2.0	V
Reverse Recovery Time	$t_{rr}$	$I_{DR} = 15A, V_{GS} = 0V$	—	180	—	ns
Reverse Recovery Charge	$Q_{rr}$	$dI_{DR} / dt = 100A / \mu s$	—	1.13	—	$\mu C$

## MARKING



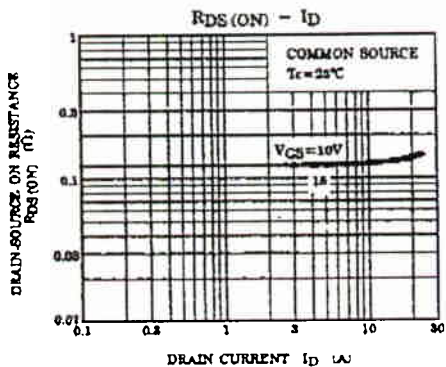
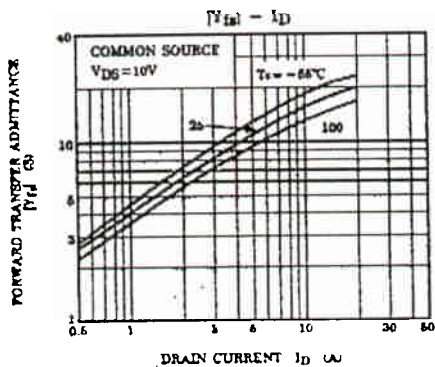
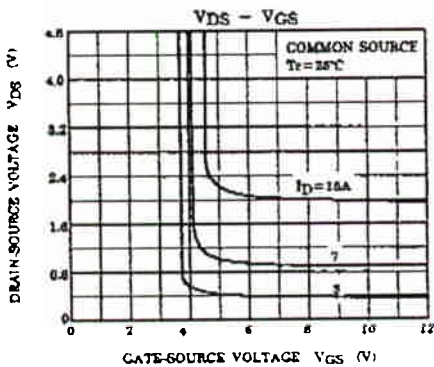
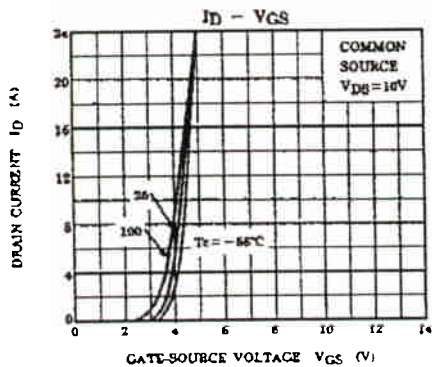
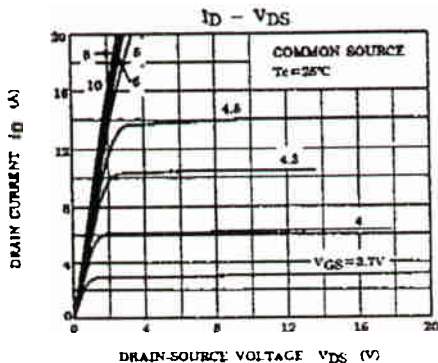
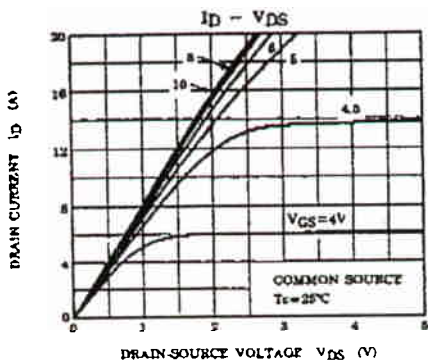
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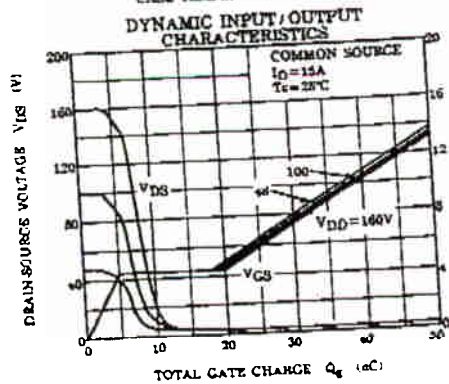
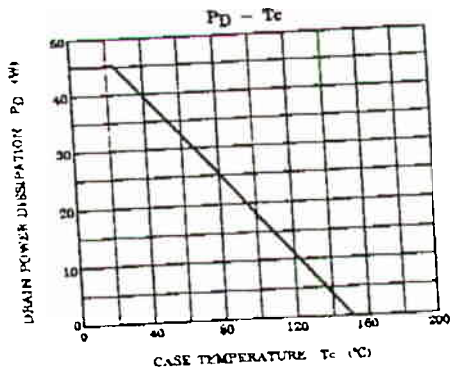
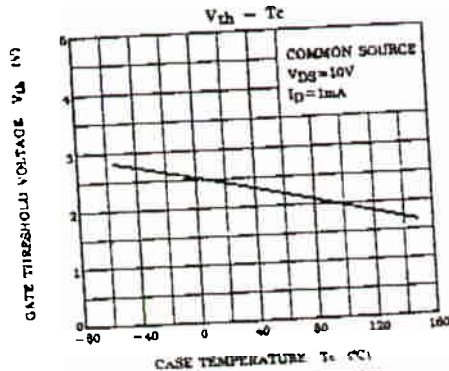
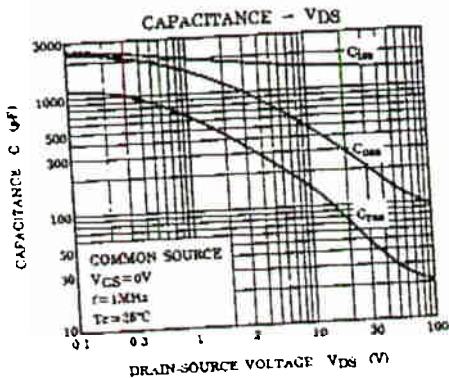
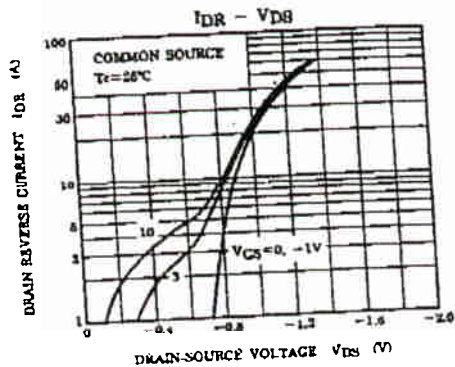
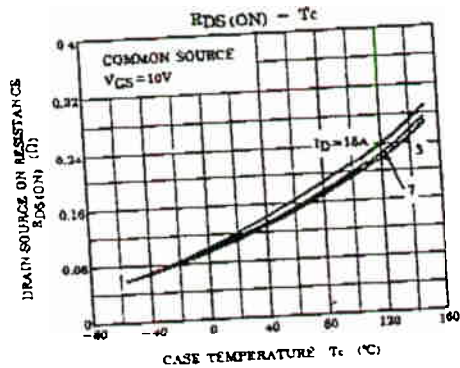
※ Lot Number



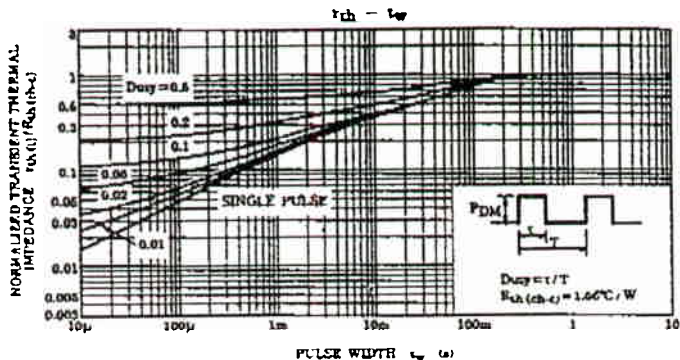
Week (01 to 53)

Year (Last Number of the Christian Era)

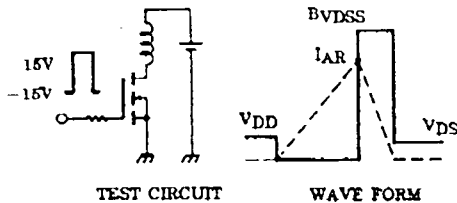
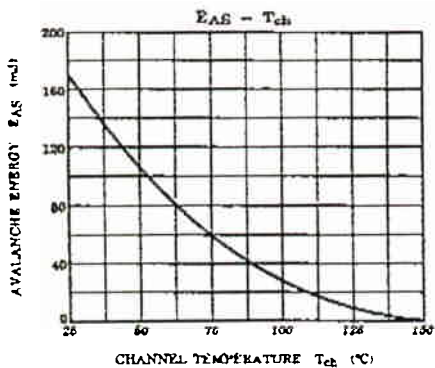
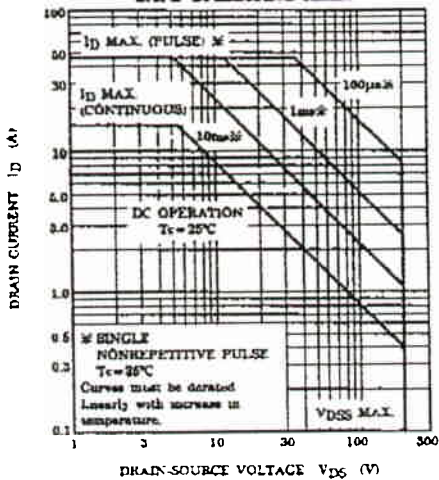




GATE-SOURCE VOLTAGE  $V_{GS}$  (V)



SAFE OPERATING AREA



Peak  $I_{AR} = 16A$ ,  $R_G = 26\Omega$   
 $V_{DD} = 60V$ ,  $L = 1.2mH$

$$E_{AS} = \frac{1}{2} \cdot L \cdot I_{AR}^2 \cdot \left( \frac{BVDSS}{BVDSS - V_{DD}} \right)$$