TOSHIBA

TOSHIBA FIELD EFFECT TRANSISTOR SILICON N CHANNEL MOS TYPE (π-MOSV)

YTA640

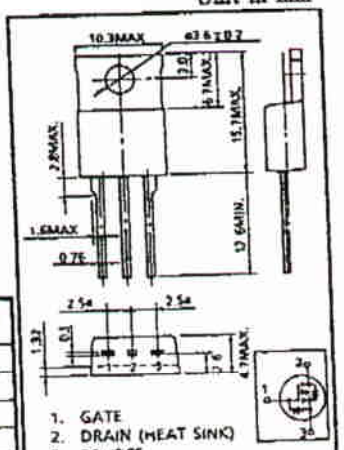
HIGH SPEED, HIGH VOLTAGE SWITCHING APPLICATIONS

SWITCHING REGULATOR, DC-DC CONVERTER AND MOTOR DRIVE APPLICATIONS

INDUSTRIAL APPLICATIONS

- 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 : $V_{th}=1.5\sim3.5V$ ($V_{DS}=10V$, $I_D=1mA$)

Unit in mm



JEDEC	TO-220AB
EIAJ	SC-46
TOSHIBA	2-10P1B

Weight : 2.0g

MAXIMUM RATINGS (Ta=25°C)

CHARACTERISTIC		SYMBOL	RATING	UNIT
Drain-Source Voltage		V_{DSS}	200	V
Drain-Gate Voltage ($R_{GS}=20k\Omega$)		V_{DGR}	200	V
Gate-Source Voltage		V_{GSS}	±20	V
Drain Current	DC	I_D	15	A
	Pulse	I_{DP}	45	A
Drain Power Dissipation (Tc=25°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	°C
Storage Temperature Range		T_{stg}	−55~150	°C

THERMAL CHARACTERISTICS

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

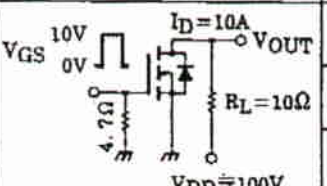
Note ;

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

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

961001EAA2

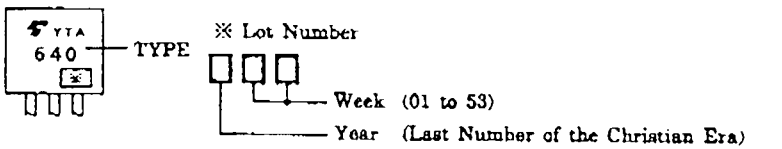
ELECTRICAL CHARACTERISTICS (Ta=25°C)

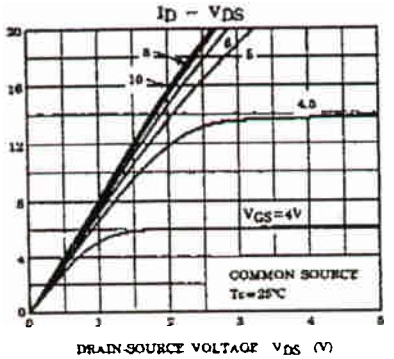
CHARACTERISTIC		SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Gate Leakage Current		I_{GSS}	$V_{GS}=\pm16V$, $V_{DS}=0V$	—	—	±10	μA
Drain Cut-off Current		I_{DSS}	$V_{DS}=200V$, $V_{GS}=0V$	—	—	100	μA
Drain-Source Breakdown Voltage		$V_{(BR)DSS}$	$I_D=10mA$, $V_{GS}=0V$	200	—	—	V
Gate Threshold Voltage		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	Ω
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_{rss}		—	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, $t_f<5ns$, Duty ≦1%, $t_w=10\mu s$	—	66	—	
Total Gate Charge (Gate-Source Plus Gate-Drain)		Q_g	$V_{DD}\fallingdotseq100V$, $V_{GS}=10V$ $I_D=15A$	—	40	—	nC
Gate-Source Charge		Q_{gs}		—	25	—	
Gate-Drain ("Miller") Charge		Q_{gd}		—	15	—	

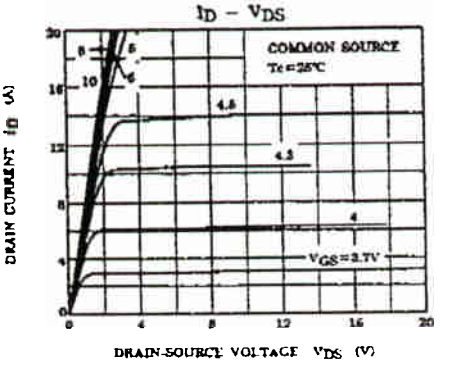
SOURCE-DRAIN DIODE RATINGS AND CHARACTERISTICS (Ta=25°C)

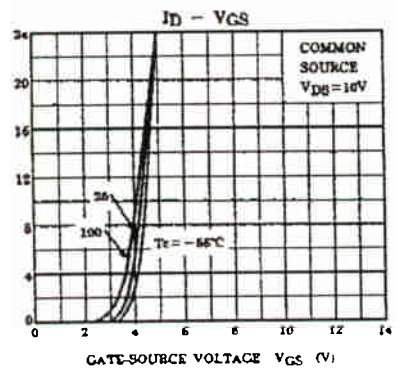
CHARACTERISTIC	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Continuous Drain Reverse Current	I_{DR}	—	—	—	15	A
Pulse Drain Reverse Current	I_{DRP}	—	—	—	45	A
Diode Forward Voltage	V_{DSF}	$I_{DR}=15A$, $V_{GS}=0V$	—	—	−2.0	V
Reverse Recovery Time	t_{rr}	$I_{DR}=15A$, $V_{GS}=0V$ $dI_{DR}/dt=100A/\mu s$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

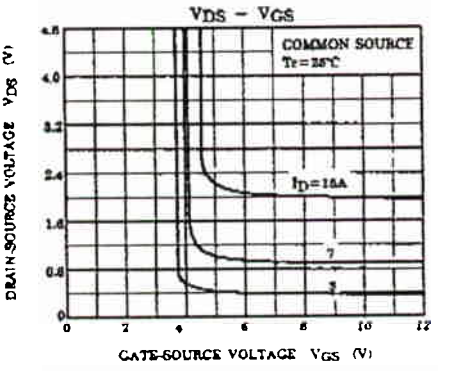
MARKING

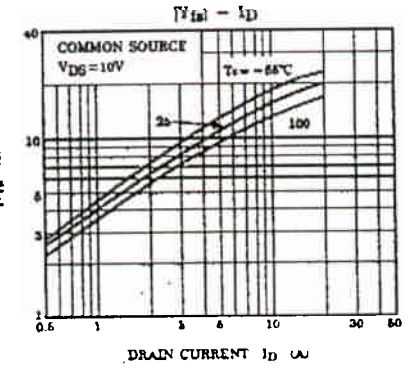


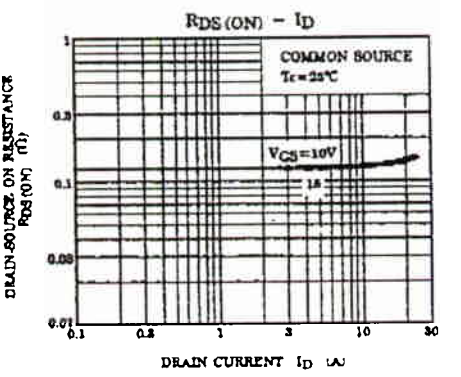

$I_D - V_{DS}$
DRAIN CURRENT I_D (A)
DRAIN-SOURCE VOLTAGE V_{DS} (V)
V_{GS}=4V
COMMON SOURCE
Tc=25°C

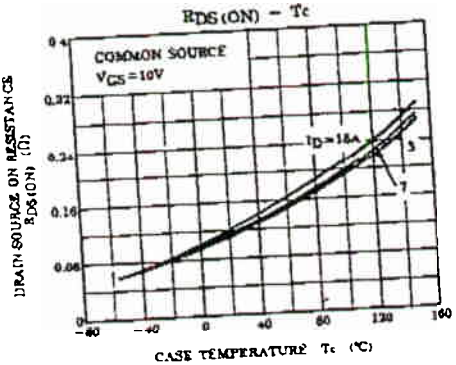

$I_D - V_{DS}$
DRAIN CURRENT I_D (A)
DRAIN-SOURCE VOLTAGE V_{DS} (V)
COMMON SOURCE
Tc=25°C
V_{GS}=3.7V

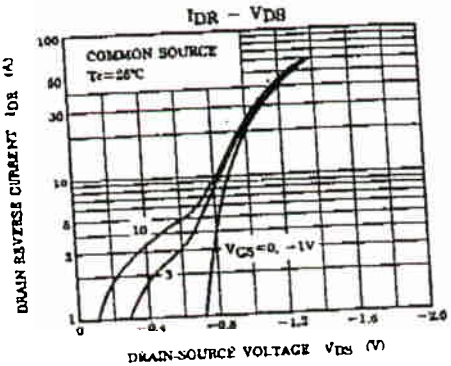

$I_D - V_{GS}$
DRAIN CURRENT I_D (A)
GATE-SOURCE VOLTAGE V_{GS} (V)
COMMON SOURCE
V_{DS}=10V
Tc=−55°C

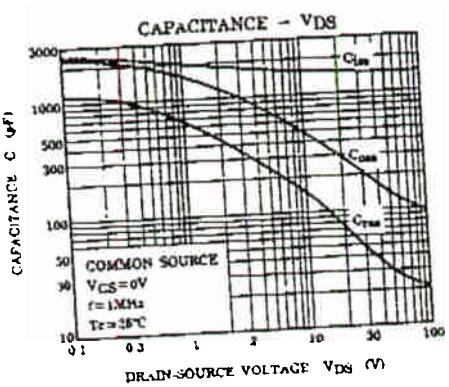

$V_{DS} - V_{GS}$
DRAIN-SOURCE VOLTAGE V_{DS} (V)
GATE-SOURCE VOLTAGE V_{GS} (V)
COMMON SOURCE
Tc=25°C
I_D=16A

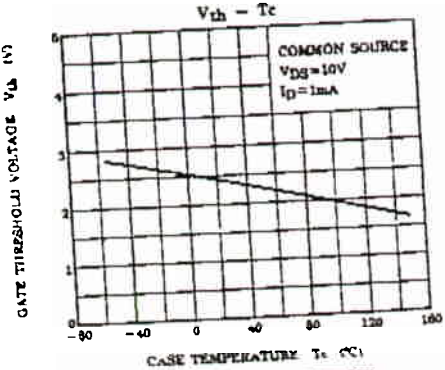

$|Y_{fs}| - I_D$
FORWARD TRANSFER ADMITTANCE $|Y_{fs}|$ (S)
DRAIN CURRENT I_D (A)
COMMON SOURCE
V_{DS}=10V
Tc=−55°C

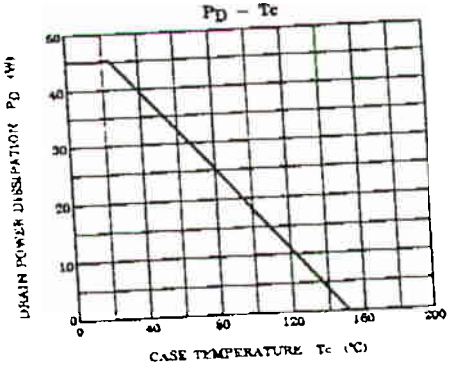

$R_{DS(ON)} - I_D$
DRAIN-SOURCE ON RESISTANCE $R_{DS(ON)}$ (Ω)
DRAIN CURRENT I_D (A)
COMMON SOURCE
Tc=25°C
V_{GS}=10V

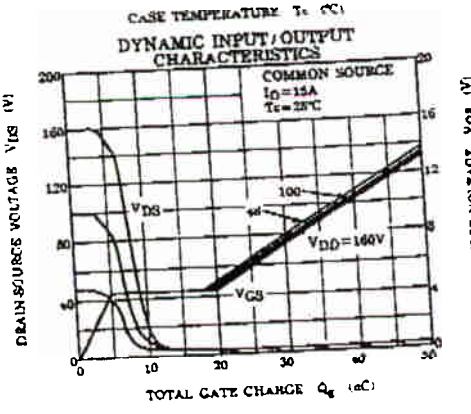

RDS (ON) – Tc
COMMON SOURCE
VGS = 10V
ID = 18A
5
7
DRAIN-SOURCE ON RESISTANCE RDS(ON) (Ω)
CASE TEMPERATURE Tc (°C)

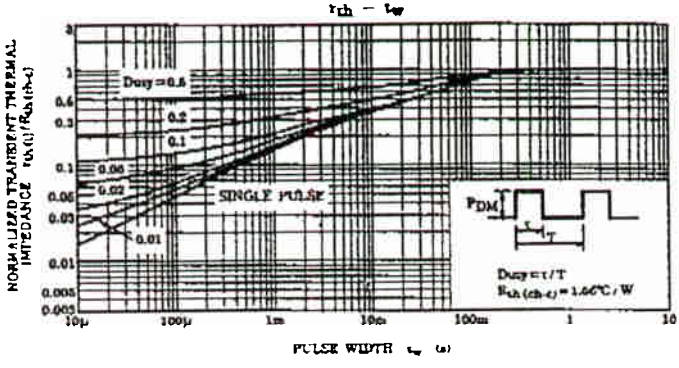

IDR – VDS
COMMON SOURCE
Tc = 25°C
VGS = 0, −1V
DRAIN REVERSE CURRENT IDR (A)
DRAIN-SOURCE VOLTAGE VDS (V)

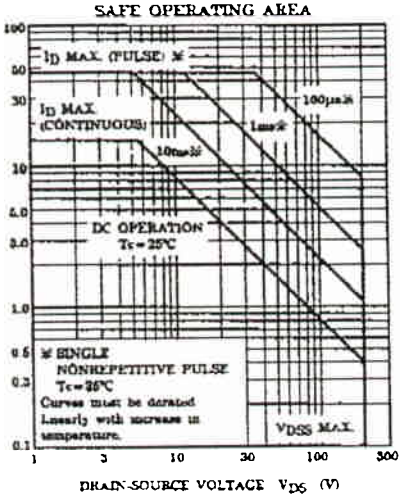

CAPACITANCE – VDS
Ciss
Coss
Crss
COMMON SOURCE
VGS = 0V
f = 1MHz
Tc = 25°C
CAPACITANCE C (pF)
DRAIN-SOURCE VOLTAGE VDS (V)

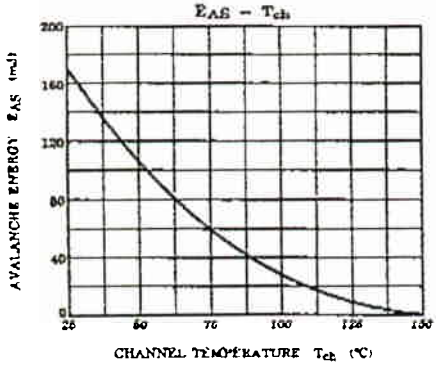

Vth – Tc
COMMON SOURCE
VDS = 10V
ID = 1mA
GATE THRESHOLD VOLTAGE Vth (V)
CASE TEMPERATURE Tc (°C)

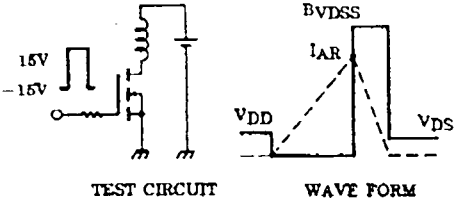

PD – Tc
DRAIN POWER DISSIPATION PD (W)
CASE TEMPERATURE Tc (°C)


DYNAMIC INPUT / OUTPUT CHARACTERISTICS
COMMON SOURCE
ID = 15A
Tc = 25°C
VDS
VDD = 160V
VGS
DRAIN-SOURCE VOLTAGE VDS (V)
GATE-SOURCE VOLTAGE VGS (V)
TOTAL GATE CHARGE Qg (nC)









Peak I_{AR} = 15A, R_G = 25Ω
V_{DD} = 50V, L = 1.2mH

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