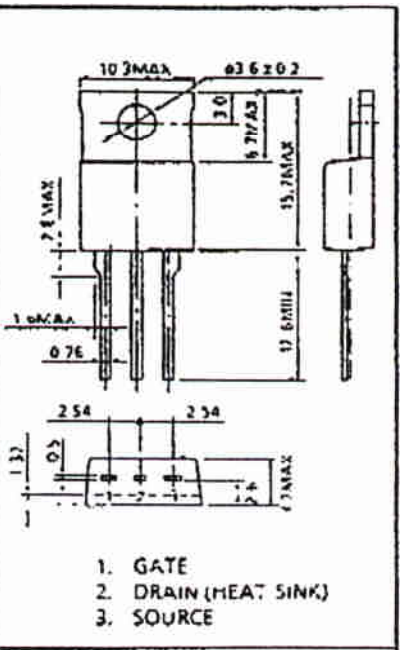
TOSHIBA FIELD EFFECT TRANSISTOR SILICON N CHANNEL MOS TYPE (L^2-π-MOSIV)

2SK1542

HIGH SPEED SWITCHING APPLICATIONS.
RELAY DRIVE, MOTOR DRIVE AND DC-DC CONVERTER APPLICATIONS.

INDUSTRIAL APPLICATIONS

Unit in mm



- 4-Volt Gate Drive
- Low Drain-Source ON Resistance : $R_{DS(ON)} = 15m\Omega$ (Typ.)
- High Forward Transfer Admittance : $|Y_{fs}| = 26S$ (Typ.)
- Low Leakage Current : $I_{DSS} = 100\mu A$ (Max.) @$V_{DS} = 60V$
- Enhancement-Mode : $V_{th} = 0.8 \sim 2.0V$ @$V_{DS} = 10V$, $I_D = 1mA$

MAXIMUM RATINGS (Ta = 25°C)

CHARACTERISTIC		SYMBOL	RATING	UNIT
Drain-Source Voltage		V_{DSS}	60	V
Drain-Gate Voltage (R_{GS} = 20kΩ)		V_{DGR}	60	V
Gate-Source Voltage		V_{GSS}	±20	V
Drain Current	DC	I_D	45	A
	Pulse	I_{DP}	180	
Drain Power Dissipation (Tc = 25°C)		P_D	125	W
Channel Temperature		T_{ch}	150	°C
Storage Temperature Range		T_{stg}	−55~150	°C

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

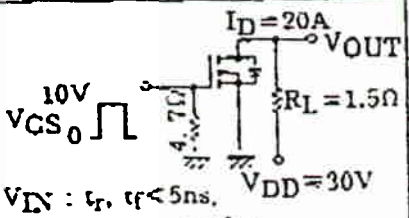
Weight : 2.0g

THERMAL CHARACTERISTICS

CHARACTERISTIC	SYMBOL	MAX.	UNIT
Thermal Resistance, Channel to Case	$R_{th(ch-c)}$	1.0	°C/W
Thermal Resistance, Channel to Ambient	$R_{th(ch-a)}$	83.3	°C/W

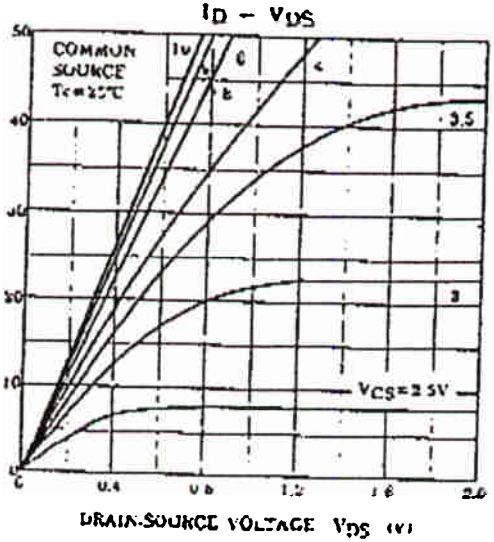
THIS TRANSISTOR IS AN ELECTROSTATIC SENSITIVE DEVICE.
PLEASE HANDLE WITH CAUTION.

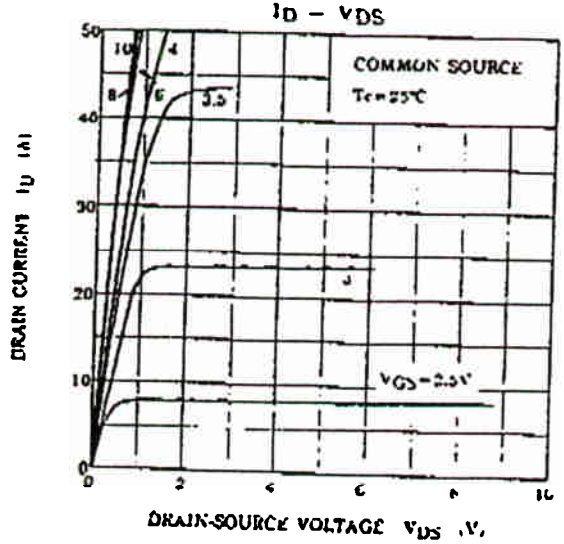
ELECTRICAL CHARACTERISTICS (Ta = 25°C)

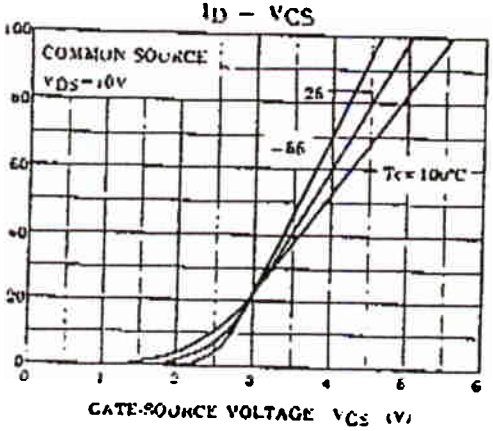
CHARACTERISTIC		SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Gate Leakage Current		I_{GSS}	V_{GS} = ±20V, V_{DS} = 0V	—	—	±100	nA
Drain Cut-off Current		I_{DSS}	V_{DS} = 60V, V_{GS} = 0V	—	—	100	μA
Drain-Source Breakdown Voltage		$V_{(BR)DSS}$	I_D = 10mA, V_{GS} = 0V	60	—	—	V
Gate Threshold Voltage		V_{th}	V_{DS} = 10V, I_D = 1mA	0.8	—	2.0	V
Drain-Source ON Resistance		$R_{DS(ON)}$	V_{GS} = 4V, I_D = 20A	—	22	35	mΩ
			V_{GS} = 10V, I_D = 20A	—	15	20	
Forward Transfer Admittance		$\|Y_{fs}\|$	V_{DS} = 10V, I_D = 20A	18	26	—	S
Input Capacitance		C_{iss}	V_{DS} = 10V, V_{GS} = 0V, f = 1MHz	—	2750	3300	pF
Reverse Transfer Capacitance		C_{rss}		—	600	1000	
Output Capacitance		C_{oss}		—	1500	2200	
Switching Time	Rise Time	t_r		—	20	40	ns
	Turn-on Time	t_{on}		—	60	120	
	Fall Time	t_f		—	80	160	
	Turn-off Time	t_{off}		—	210	400	
Total Gate Charge (Gate-Source Plus Gate-Drain)		Q_g	V_{DD} = 48V, V_{GS} = 10V, I_D = 45A	—	200	400	nC
Gate-Source Charge		Q_{gs}		—	65	—	
Gate-Drain ("Miller") Charge		Q_{gd}		—	135	—	

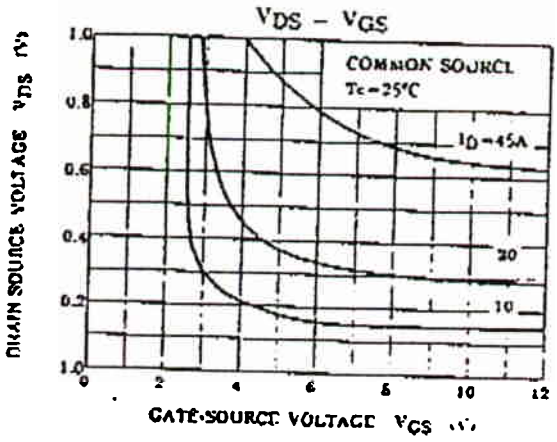
SOURCE-DRAIN DIODE RATINGS AND CHARACTERISTICS (Ta = 25°C)

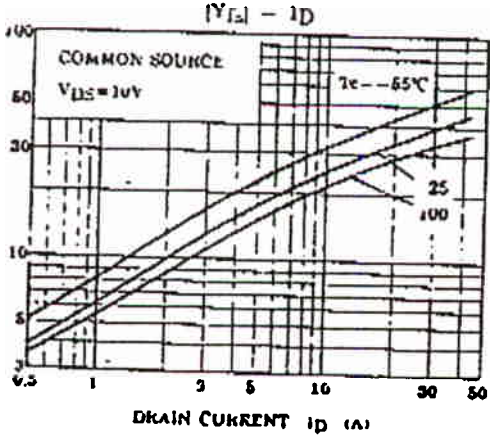
CHARACTERISTIC	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Continuous Drain Reverse Current	I_{DR}	—	—	—	45	A
Pulse Drain Reverse Current	I_{DRP}	—	—	—	180	A
Diode Forward Voltage	V_{DSF}	I_{DR} = 45A, V_{GS} = 0V	—	—	−2.0	V
Reverse Recovery Time	t_{rr}	I_{DR} = 45A, V_{GS} = 0V, dI_{DR}/dt = 50A/μs	—	160	—	ns
Reverse Recovered Charge	Q_{rr}		—	0.2	—	μC

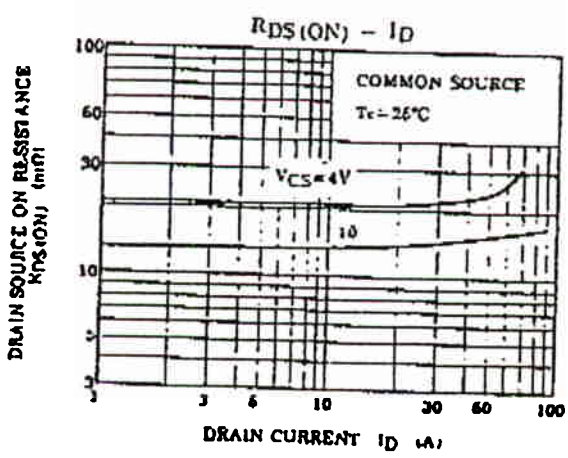

$I_D - V_{DS}$
COMMON SOURCE
Tc=25°C
10
8
6
5
4
3.5
3
V_{GS}=2.5V
DRAIN CURRENT I_D (A)
DRAIN-SOURCE VOLTAGE V_{DS} (V)

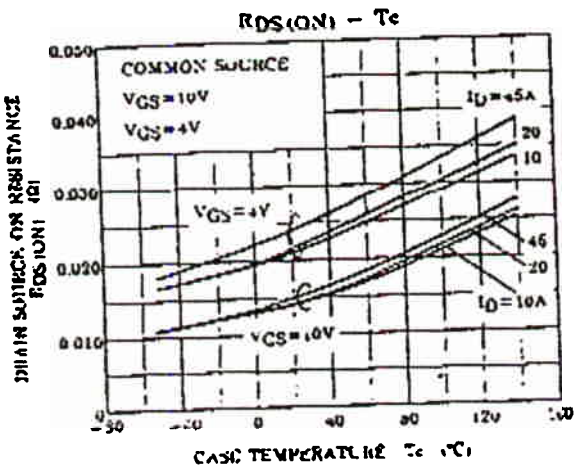

$I_D - V_{DS}$
COMMON SOURCE
Tc=25°C
10
8
6
5.5
4
3
V_{GS}=2.5V
DRAIN CURRENT I_D (A)
DRAIN-SOURCE VOLTAGE V_{DS} (V)

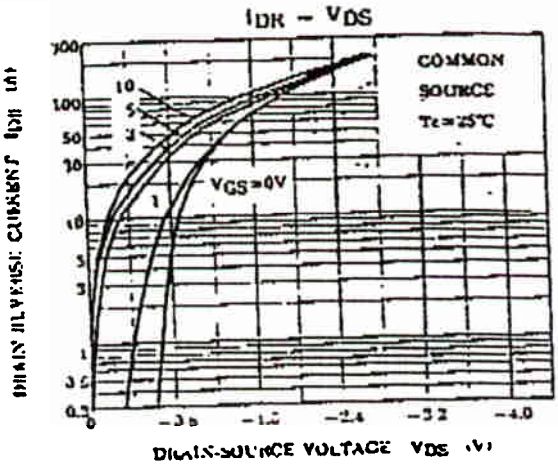

$I_D - V_{GS}$
COMMON SOURCE
V_{DS}=10V
25
-55
Tc=100°C
DRAIN CURRENT I_D (A)
GATE-SOURCE VOLTAGE V_{GS} (V)

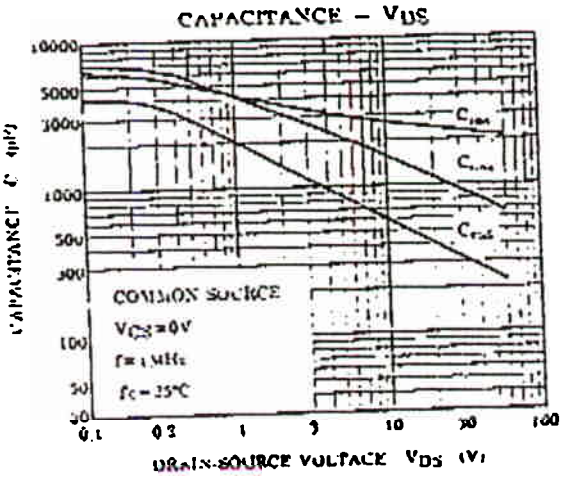

$V_{DS} - V_{GS}$
COMMON SOURCE
Tc=25°C
I_D=45A
30
10
DRAIN SOURCE VOLTAGE V_{DS} (V)
GATE-SOURCE VOLTAGE V_{GS} (V)

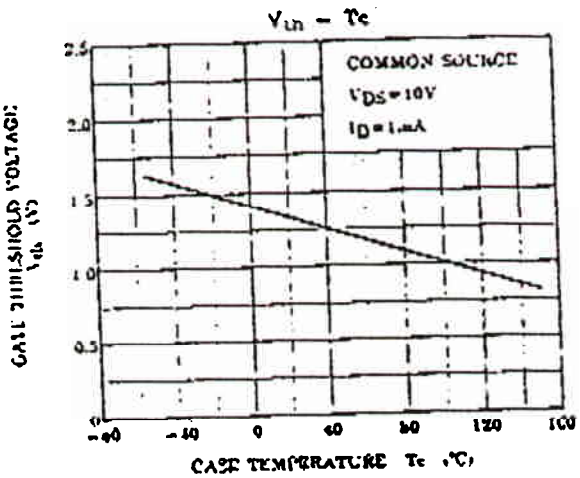

$|Y_{fs}| - I_D$
COMMON SOURCE
V_{DS}=10V
Tc=-55°C
25
100
$|Y_{fs}|$ (S)
DRAIN CURRENT I_D (A)

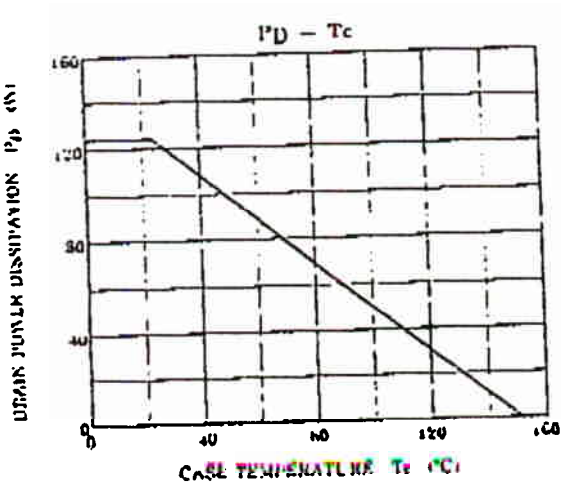

$R_{DS(ON)} - I_D$
COMMON SOURCE
Tc=25°C
V_{GS}=4V
10
DRAIN SOURCE ON RESISTANCE $R_{DS(ON)}$ (mΩ)
DRAIN CURRENT I_D (A)

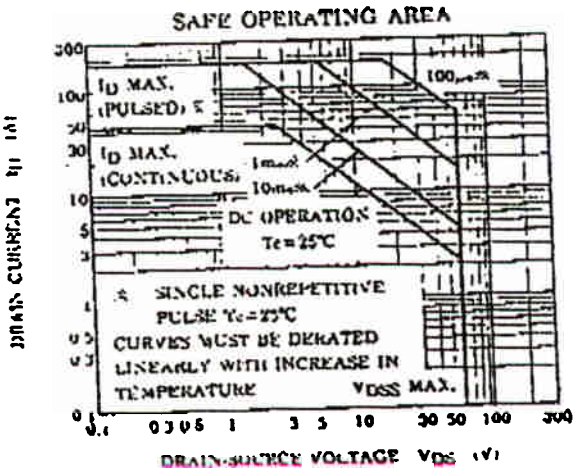

RDS(ON) – Tc
COMMON SOURCE
VGS=10V
VGS=4V
ID=45A
20
10
VGS=4V
45
20
ID=10A
VGS=10V
DRAIN-SOURCE ON RESISTANCE RDS(ON) (Ω)
CASE TEMPERATURE Tc (°C)

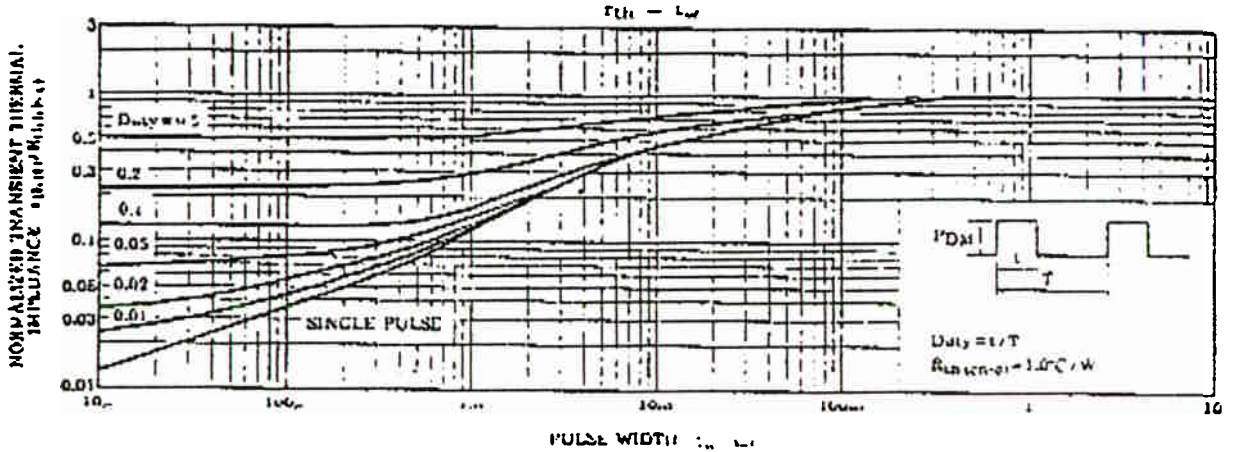

IDR – VDS
COMMON SOURCE
Tc=25°C
VGS=0V
DRAIN REVERSE CURRENT IDR (A)
DRAIN-SOURCE VOLTAGE VDS (V)


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)


SAFE OPERATING AREA
ID MAX. (PULSED)*
ID MAX. (CONTINUOUS)
1ms*
10ms*
DC OPERATION
Tc=25°C
* SINGLE NONREPETITIVE PULSE Tc=25°C
CURVES MUST BE DERATED LINEARLY WITH INCREASE IN TEMPERATURE
VDSS MAX.
DRAIN CURRENT ID (A)
DRAIN-SOURCE VOLTAGE VDS (V)


Duty = 0.5
0.2
0.1
0.05
0.02
0.01
SINGLE PULSE
PDM
T
Duty = t/T