Field Effect Transistor

Silicon N Channel MOS Type (π-MOS III.5)

High Speed, High Current DC-DC Converter, Relay Drive and Motor Drive Applications

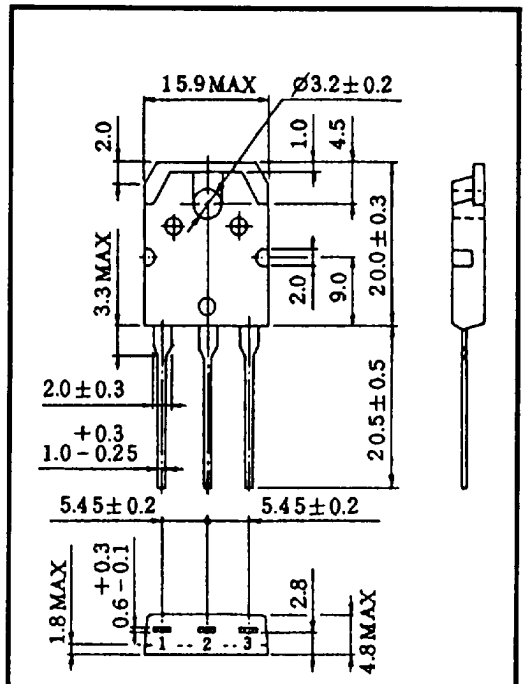
Features

- Low Drain-Source ON Resistance
  - $R_{DS(ON)}$ = 0.75Ω (Typ.)
- High Forward Transfer Admittance
  - $|Y_{fs}|$ = 4.9S (Typ.)
- Low Leakage Current
  - I_{DSS} = 300μA (Max.) @ V_{DS} = 500V
- Enhancement-Mode
  - V_{th} = 2.0 ~ 4.0V @ V_{DS} = 10V, I_D = 1mA

Absolute Maximum Ratings (Ta = 25°C)

CHARACTERISTIC		SYMBOL	RATING	UNIT
Drain-Source Voltage		V_{DSS}	500	V
Drain-Gate Voltage (R_{GS} = 20kΩ)		V_{DGR}	500	V
Gate-Source Voltage		V_{GSS}	±30	V
Drain Current	DC	I_D	10	A
	Pulse	I_{DP}	40	
Drain Power Dissipation (Tc = 25°C)		P_D	125	W
Channel Temperature		T_{ch}	150	°C
Storage Temperature Range		T_{stg}	-55 ~ 150	°C

Unit in mm



1. GATE
2. DRAIN (HEAT SINK)
3. SOURCE

JEDEC	—
EIAJ	SC-65
TOSHIBA	2-16C1B

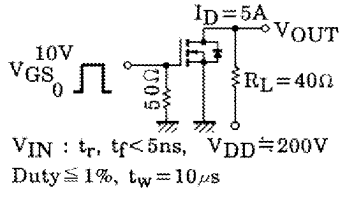
Weight : 4.6g

Thermal Characteristics

CHARACTERISTIC	SYMBOL	MAX.	UNIT
Thermal Resistance, Channel to Case	$R_{th(ch-c)}$	1.0	°C/W
Thermal Resistance, Channel to Ambient	$R_{th(ch-a)}$	50	°C/W

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

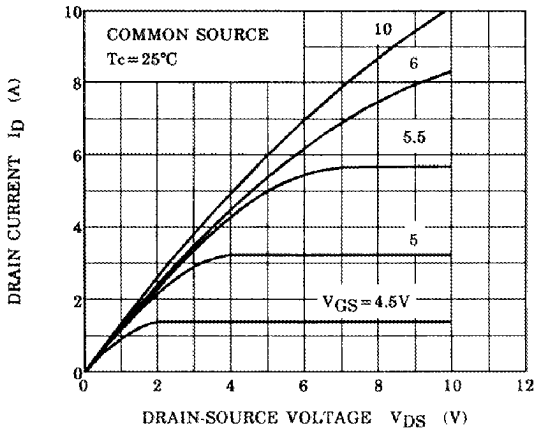
Electrical Characteristics (Ta = 25°C)

CHARACTERISTIC		SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Gate Leakage Current		I_{GSS}	V_{GS} = ±30V, V_{DS} = 0V	–	–	±100	nA
Drain Cut-off Current		I_{DSS}	V_{DS} = 500V, V_{GS} = 0V	–	–	300	μA
Drain-Source Breakdown Voltage		$V_{(BR)\ DSS}$	I_D = 10mA, V_{GS} = 0V	500	–	–	V
Gate Threshold Voltage		V_{th}	V_{DS} = 10V, I_D = 1mA	2.0	–	4.0	V
Drain-Source ON Resistance		$R_{DS\ (ON)}$	I_D = 5A, V_{GS} = 10V	–	0.75	1.0	Ω
Forward Transfer Admittance		$\|Y_{fs}\|$	V_{DS} = 10V, I_D = 5A	3.0	4.9	–	S
Input Capacitance		C_{iss}	V_{DS} = 10V, V_{GS} = 0V, f = 1MHz	–	870	1100	pF
Reverse Transfer Capacitance		C_{rss}		–	75	250	
Output Capacitance		C_{oss}		–	210	300	
Switching Time	Rise Time	t_r		–	30	90	ns
	Turn-on Time	t_{on}		–	60	140	
	Fall Time	t_f		–	35	130	
	Turn-off Time	t_{off}		–	100	300	
Total Gate Charge (Gate-Source Plus Gate-Drain)		Q_g	V_{DD} = 400V, V_{GS} = 10V, I_D = 10A	–	40	85	nC
Gate-Source Charge		Q_{gs}		–	16	–	
Gate-Drain ("Miller") Charge		Q_{gd}		–	24	–	

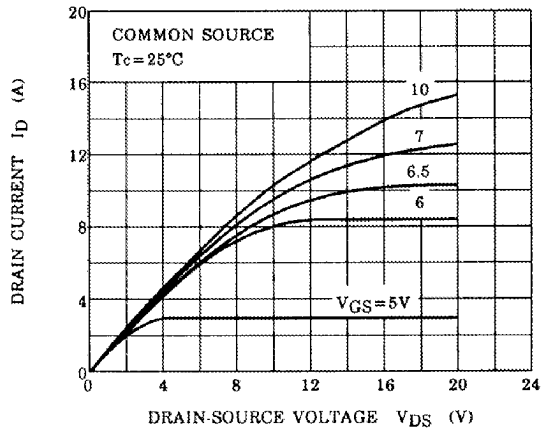
Source-Drain Diode Ratings and Characteristics (Ta = 25°C)

CHARACTERISTICS	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Continuous Drain Reverse Current	I_{DR}	–	–	–	10	A
Pulse Drain Reverse Current	I_{DRP}	–	–	–	40	A
Diode Forward Voltage	V_{DSF}	I_{DR} = 10A, V_{GS} = 0V	–	–	-2.0	V
Reverse Recovery Time	t_{rr}	I_{DR} = 10A, V_{GS} = 0V, dI_{DR}/dt = 100A/μs	–	360	–	ns
Reverse Recovered Charge	Q_{rr}		–	3.0	–	μC

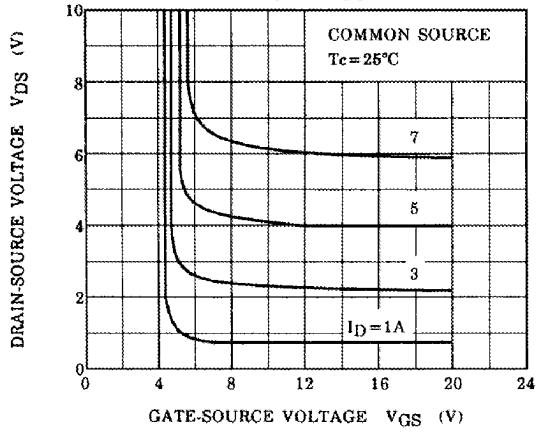
$I_D - V_{DS}$



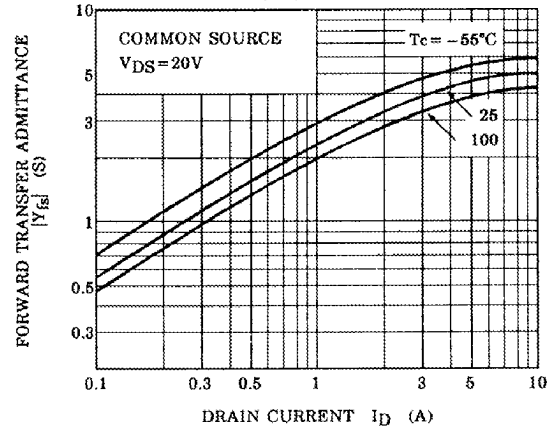
$I_D - V_{DS}$



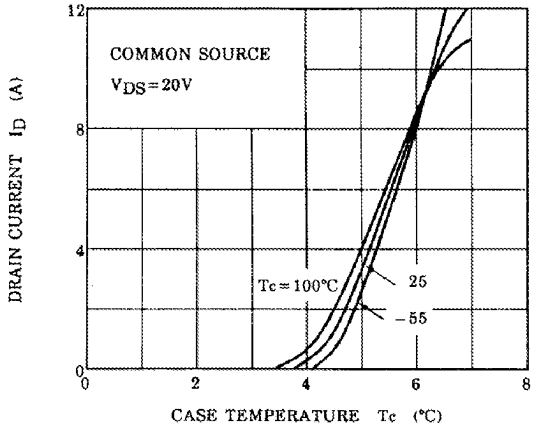
$V_{DS} - V_{GS}$



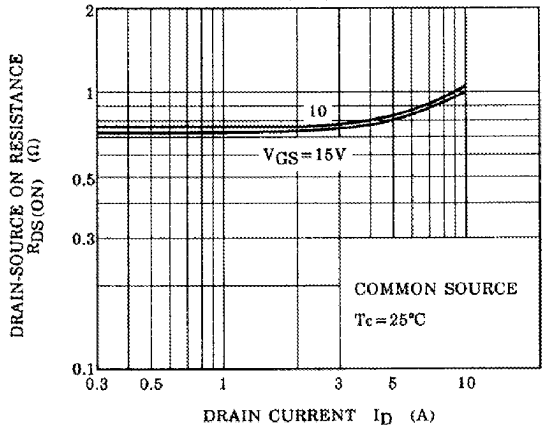
$|Y_{fs}| - I_D$



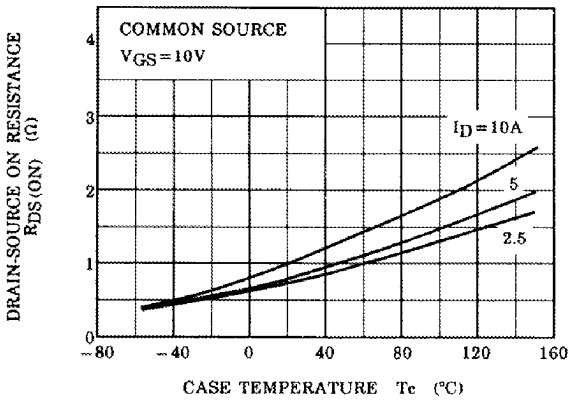
$I_D - V_{GS}$



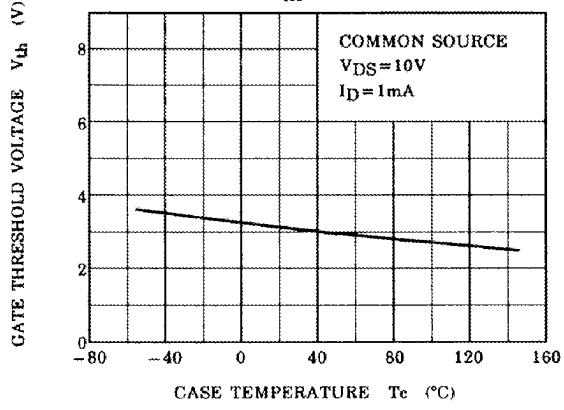
$R_{DS(ON)} - I_D$



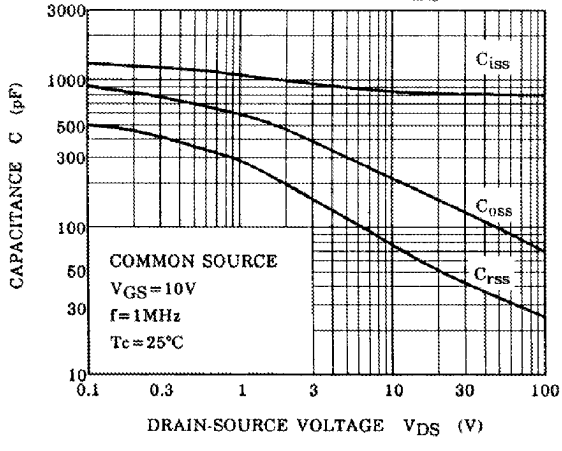
$R_{DS(ON)}$ – Tc



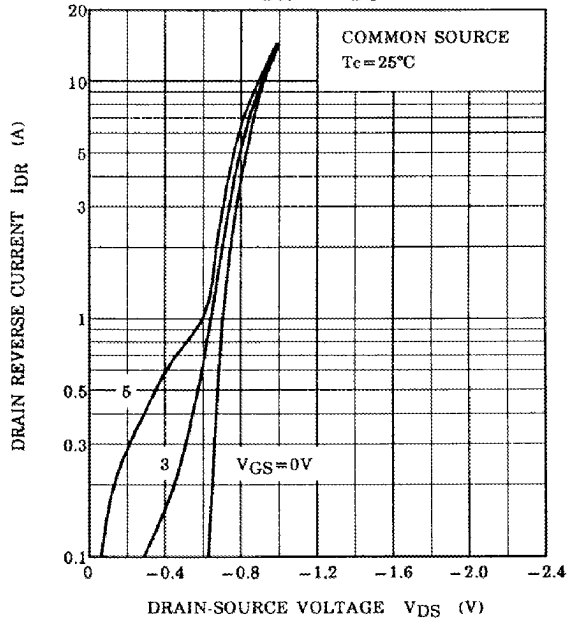
V_{th} – Tc



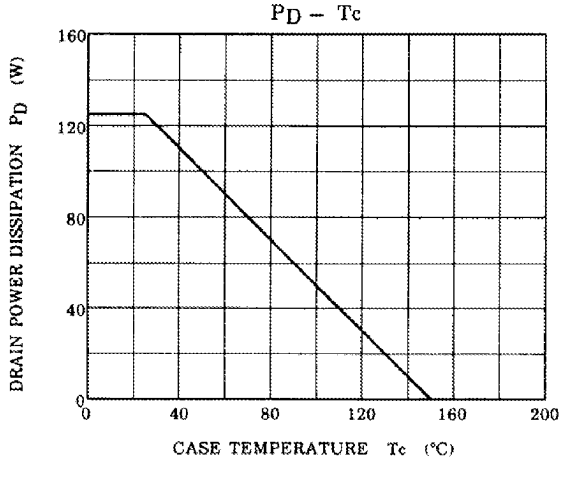
CAPACITANCE – V_{DS}

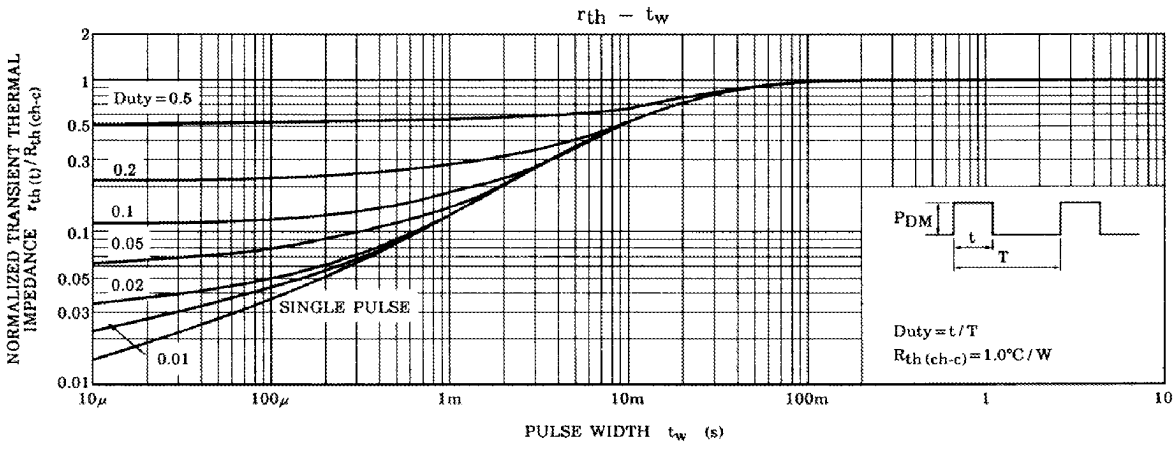


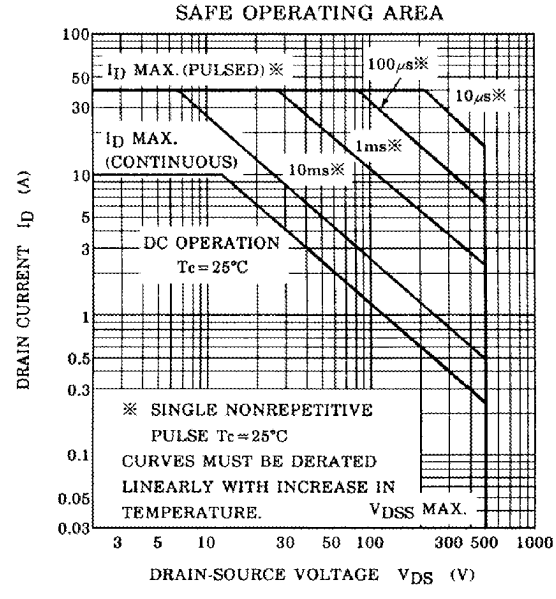
I_{DR} – V_{DS}



P_D – Tc




r_{th} – t_w
NORMALIZED TRANSIENT THERMAL IMPEDANCE $r_{th}(t)/R_{th(ch-c)}$
Duty = 0.5
0.2
0.1
0.05
0.02
0.01
SINGLE PULSE
P_{DM}
t
T
Duty = t/T
$R_{th(ch-c)}$ = 1.0°C/W
2
1
0.5
0.3
0.1
0.05
0.03
0.01
10μ
100μ
1m
10m
100m
1
10
PULSE WIDTH t_w (s)


SAFE OPERATING AREA
DRAIN CURRENT I_D (A)
I_D MAX. (PULSED) ※
100μs※
10μs※
1ms※
10ms※
I_D MAX. (CONTINUOUS)
DC OPERATION
Tc = 25°C
※ SINGLE NONREPETITIVE PULSE Tc = 25°C
CURVES MUST BE DERATED LINEARLY WITH INCREASE IN TEMPERATURE.
V_{DSS} MAX.
100
50
30
10
5
3
1
0.5
0.3
0.1
0.05
0.03
3
5
10
30
50
100
300
500
1000
DRAIN-SOURCE VOLTAGE V_{DS} (V)