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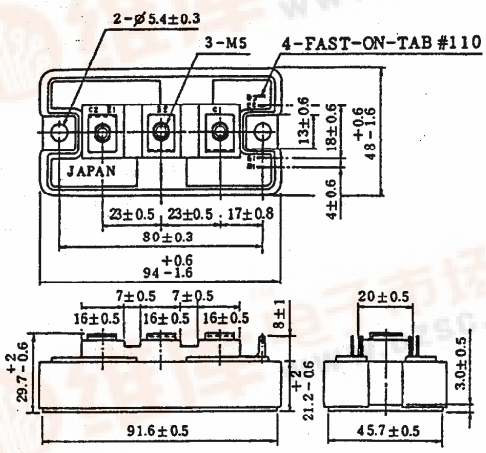
TOSHIBA GTR MODULE SILICON N CHANNEL IGBT

MG150J2YS50

HIGH POWER SWITCHING APPLICATIONS.

MOTOR CONTROL APPLICATIONS.

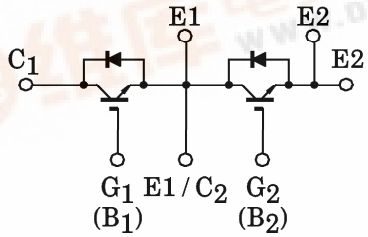
Unit in mm



JEDEC	—
EIAJ	—
TOSHIBA	2-95A1A

- The Electrodes are Isolated from Case.
- High Input Impedance
- Includes a Complete Half Bridge in One Package.
- Enhancement-Mode
- High Speed : $t_f = 0.30\mu s$ (Max.) ($I_C = 150A$)
  $t_{rr} = 0.15\mu s$ (Max.) ($I_F = 150A$)
- Low Saturation Voltage
  : $V_{CE\,(sat)} = 2.70V$ (Max.) ($I_C = 150A$)

EQUIVALENT CIRCUIT



MAXIMUM RATINGS (Ta = 25°C)

CHARACTERISTIC		SYMBOL	RATING	UNIT
Collector-Emitter Voltage		V_{CES}	600	V
Gate-Emitter Voltage		V_{GES}	±20	V
Collector Current	DC	I_C	150	A
	1ms	I_{CP}	300	
Forward Current	DC	I_F	150	A
	1ms	I_{FM}	300	
Collector Power Dissipation (Tc = 25°C)		P_C	780	W
Junction Temperature		T_j	150	°C
Storage Temperature Range		T_{stg}	−40~125	°C
Isolation Voltage		V_{Isol}	2500 (AC 1Min.)	V
Screw Torque (Terminal / Mounting)		—	3 / 3	N·m

961001EAA2

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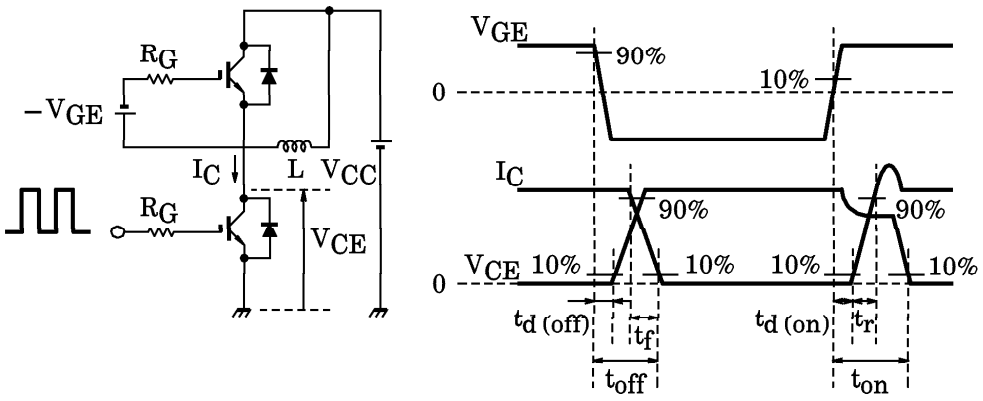
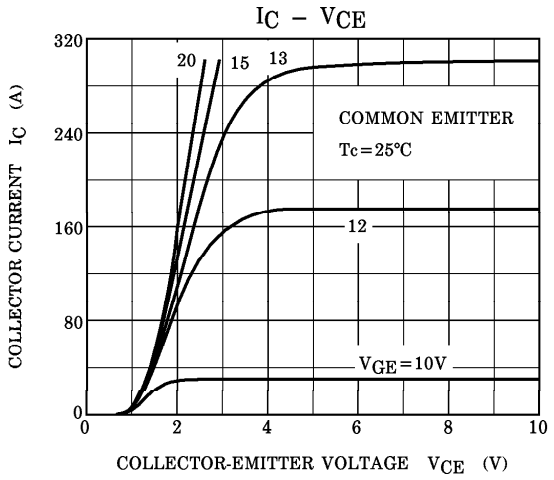
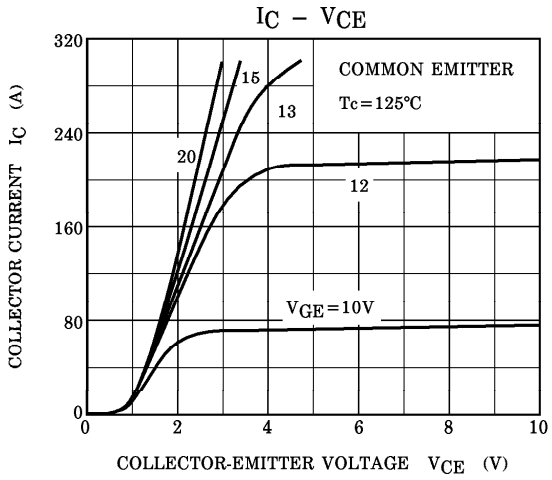
ELECTRICAL CHARACTERISTICS (Ta = 25°C)

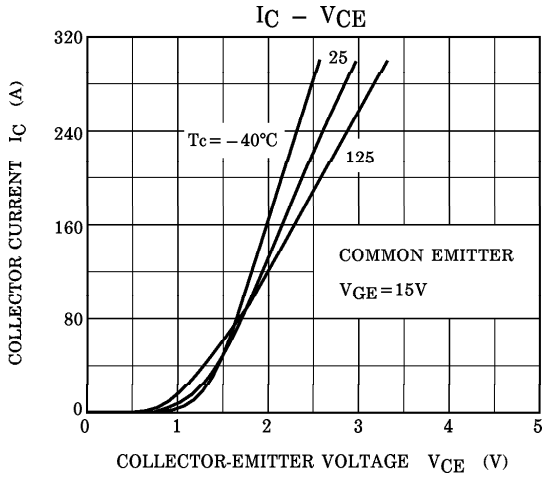
CHARACTERISTIC		SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Gate Leakage Current		I_{GES}	$V_{GE} = \pm 20V$, $V_{CE} = 0$	—	—	±500	nA
Collector Cut-off Current		I_{CES}	$V_{CE} = 600V$, $V_{GE} = 0$	—	—	2.0	mA
Gate-Emitter Cut-off Voltage		$V_{GE (off)}$	$I_C = 15mA$, $V_{CE} = 5V$	5.0	7.0	8.0	V
Collector-Emitter Saturation Voltage		$V_{CE (sat)}$	$I_C = 150A$, $V_{GE} = 15V$	—	2.10	2.70	V
Input Capacitance		C_{ies}	$V_{CE} = 10V$, $V_{GE} = 0$, f = 1MHz	—	14200	—	pF
Switching Time	Turn-on Delay Time	$t_{d (on)}$	Inductive Load $V_{CC} = 300V$ $I_C = 150A$ $V_{GE} = \pm 15V$ $R_G = 6.2\Omega$ (Note 1)	—	0.15	0.30	μs
	Rise Time	t_r		—	0.15	0.30	
	Turn-on Time	t_{on}		—	0.50	1.00	
	Turn-off Delay Time	$t_{d (off)}$		—	0.20	0.40	
	Fall Time	t_f		—	0.15	0.30	
	Turn-off Time	t_{off}		—	0.50	1.00	
Forward Voltage		V_F	$I_F = 150A$, $V_{GE} = 0$	—	2.30	3.00	V
Reverse Recovery Time		t_{rr}	$I_F = 150A$, $V_{GE} = -10V$ $di / dt = 200A / \mu s$	—	0.08	0.15	μs
Thermal Resistance		$R_{th (j-c)}$	Transistor Stage	—	—	0.16	°C / W
			Diode Stage	—	—	0.35	

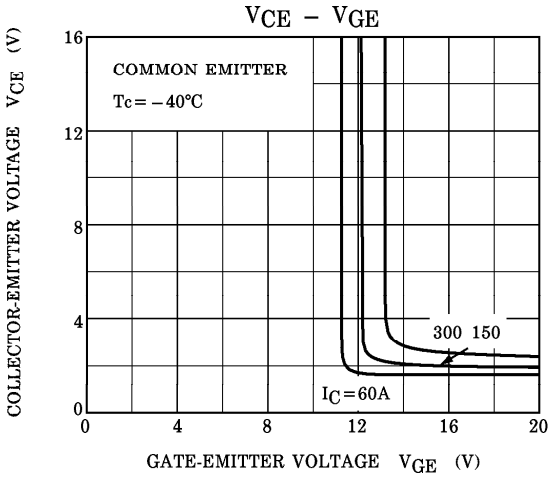
Note 1 Switching Time Test Circuit & Timing Chart

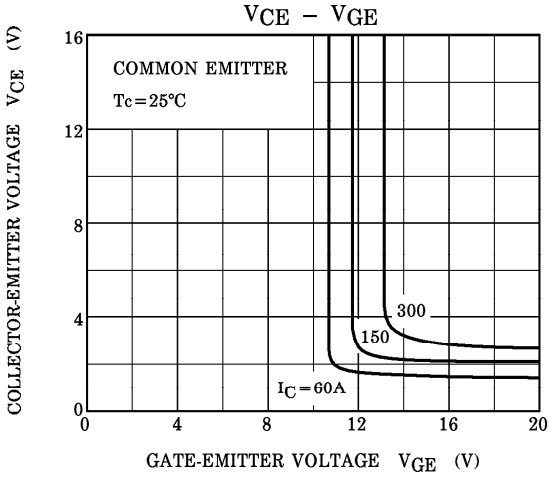


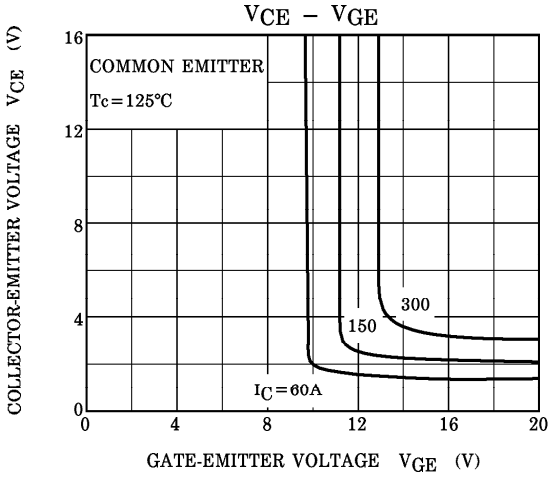

IC – VCE
COMMON EMITTER
Tc=25°C
20
15
13
12
VGE=10V
COLLECTOR CURRENT IC (A)
COLLECTOR-EMITTER VOLTAGE VCE (V)


IC – VCE
COMMON EMITTER
Tc=125°C
20
15
13
12
VGE=10V
COLLECTOR CURRENT IC (A)
COLLECTOR-EMITTER VOLTAGE VCE (V)

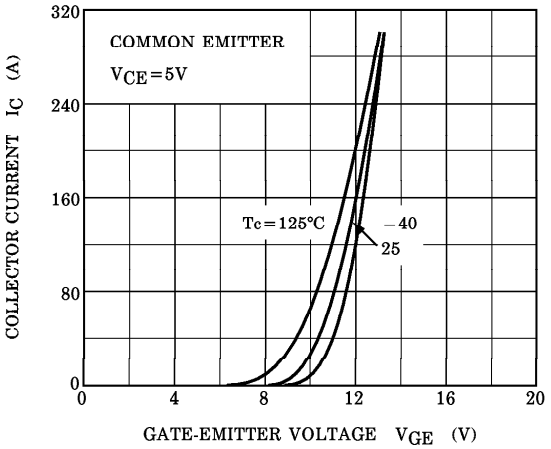

IC – VCE
Tc=–40°C
25
125
COMMON EMITTER
VGE=15V
COLLECTOR CURRENT IC (A)
COLLECTOR-EMITTER VOLTAGE VCE (V)


VCE – VGE
COMMON EMITTER
Tc=–40°C
300
150
IC=60A
COLLECTOR-EMITTER VOLTAGE VCE (V)
GATE-EMITTER VOLTAGE VGE (V)

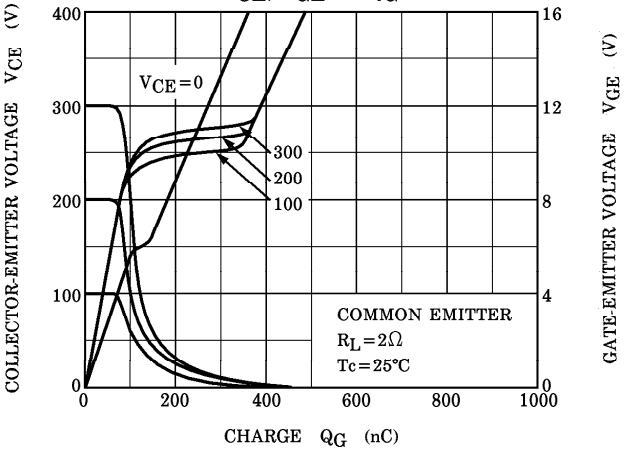

VCE – VGE
COMMON EMITTER
Tc=25°C
300
150
IC=60A
COLLECTOR-EMITTER VOLTAGE VCE (V)
GATE-EMITTER VOLTAGE VGE (V)


VCE – VGE
COMMON EMITTER
Tc=125°C
300
150
IC=60A
COLLECTOR-EMITTER VOLTAGE VCE (V)
GATE-EMITTER VOLTAGE VGE (V)

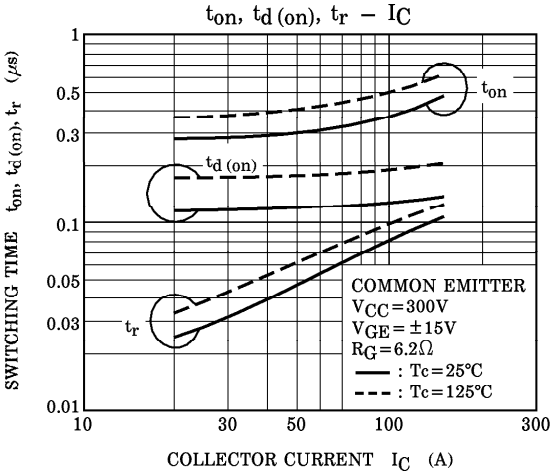
I_C – V_{GE}



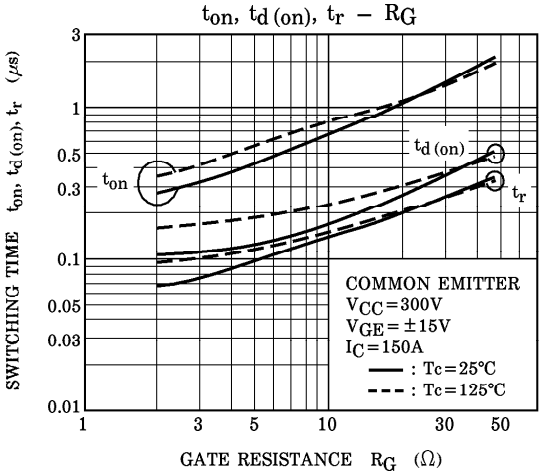
V_{CE}, V_{GE} – Q_G



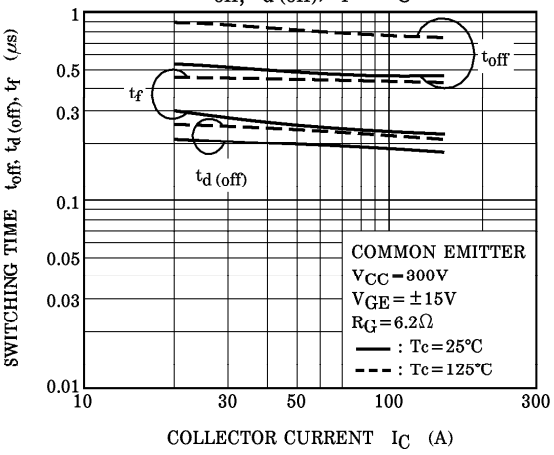
t_{on}, $t_{d(on)}$, t_r – I_C



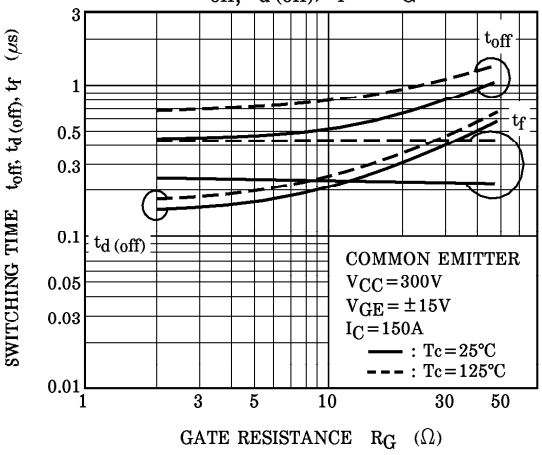
t_{on}, $t_{d(on)}$, t_r – R_G

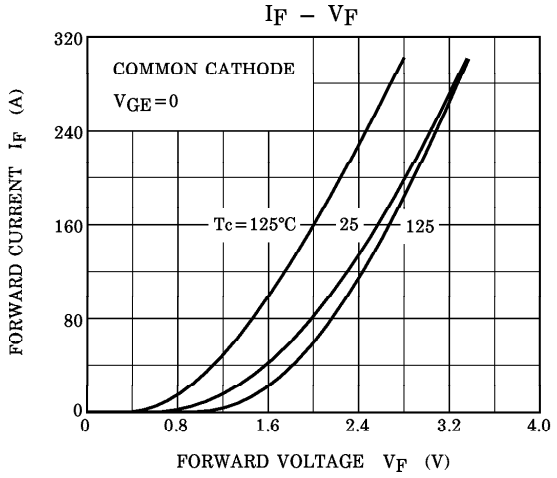


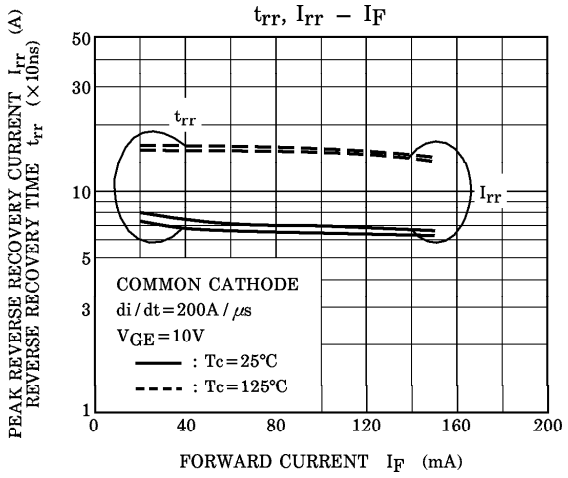
t_{off}, $t_{d(off)}$, t_f – I_C

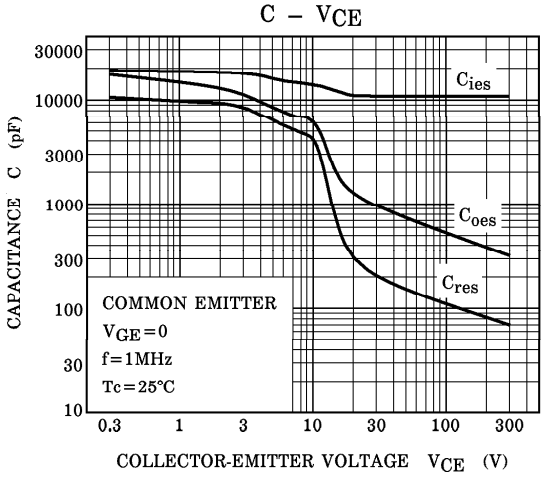


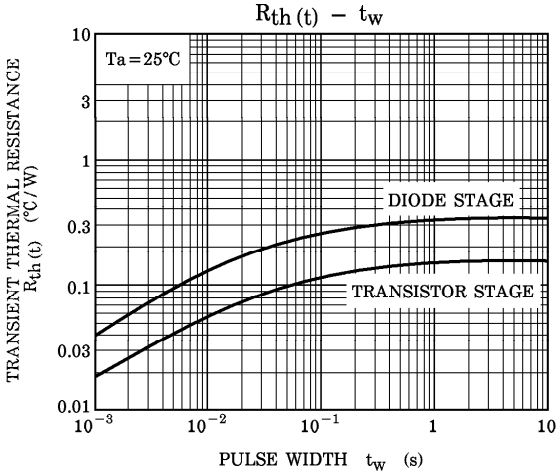
t_{off}, $t_{d(off)}$, t_f – R_G

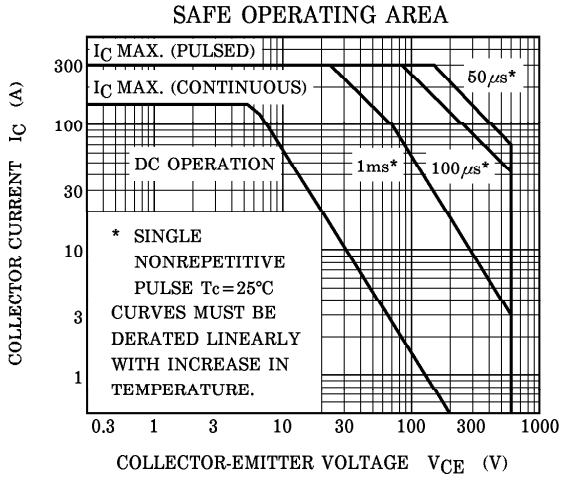


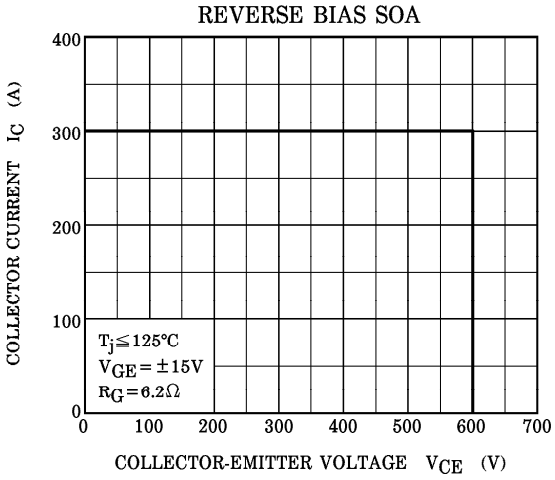

IF – VF
COMMON CATHODE
VGE=0
Tc=125°C
25
125
FORWARD CURRENT IF (A)
FORWARD VOLTAGE VF (V)
0
80
160
240
320
0
0.8
1.6
2.4
3.2
4.0


trr, Irr – IF
trr
Irr
COMMON CATHODE
di/dt=200A/μs
VGE=10V
: Tc=25°C
: Tc=125°C
PEAK REVERSE RECOVERY CURRENT Irr (A)
REVERSE RECOVERY TIME trr (×10ns)
FORWARD CURRENT IF (mA)
1
3
5
10
30
50
0
40
80
120
160
200


C – VCE
Cies
Coes
Cres
COMMON EMITTER
VGE=0
f=1MHz
Tc=25°C
CAPACITANCE C (pF)
COLLECTOR-EMITTER VOLTAGE VCE (V)
10
30
100
300
1000
3000
10000
30000
0.3
1
3
10
30
100
300


Rth (t) – tw
Ta=25°C
DIODE STAGE
TRANSISTOR STAGE
TRANSIENT THERMAL RESISTANCE
Rth (t) (°C/W)
PULSE WIDTH tw (s)
0.01
0.03
0.1
0.3
1
3
10
10−3
10−2
10−1
1
10


SAFE OPERATING AREA
IC MAX. (PULSED)
IC MAX. (CONTINUOUS)
DC OPERATION
50μs*
1ms*
100μs*
* SINGLE
NONREPETITIVE
PULSE Tc=25°C
CURVES MUST BE
DERATED LINEARLY
WITH INCREASE IN
TEMPERATURE.
COLLECTOR CURRENT IC (A)
COLLECTOR-EMITTER VOLTAGE VCE (V)
1
3
10
30
100
300
0.3
1
3
10
30
100
300
1000


REVERSE BIAS SOA
Tj≤125°C
VGE=±15V
RG=6.2Ω
COLLECTOR CURRENT IC (A)
COLLECTOR-EMITTER VOLTAGE VCE (V)
0
100
200
300
400
0
100
200
300
400
500
600
700