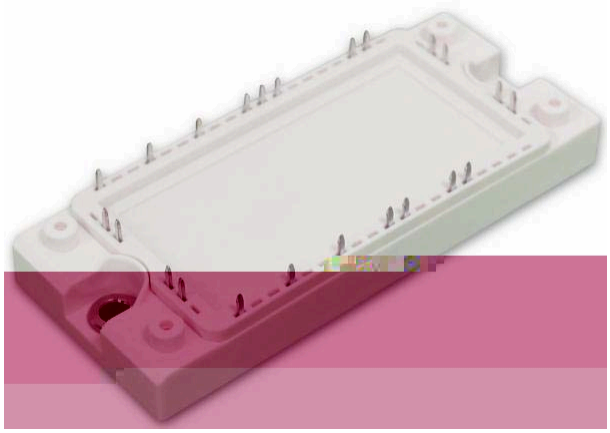
MG50P12E1A

RoHS COMPLIANT



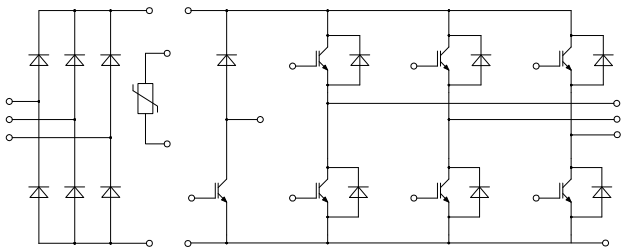
IGBT Modules

VCES	1200V
IC	50A

Applications

- Motor Drivers
- AC and DC servo drive amplifier
- UPS (Uninterruptible Power Supplies)

Circuit



Features

- Low switching losses
- Low $v_{ce(sat)}$ with positive temperature coefficient
- Including fast & soft recovery anti-parallel FWD
- Low inductance case
- High short circuit capability(10us)
- Maximum junction temperature 175℃

● IGBT- inverter

Absolute Maximum Ratings

Parameter	Symbol	Conditions	Value	Unit
Collector-Emitter Voltage	V_{CES}	V_{GE}=0V, I_C =1mA, T_{vj}=25	1200	V
Continuous Collector Current	I_C	T_c=100 , T_{vjmax}=175	50	A
Repetitive Peak Collector Current	I_{CRM}	tp=1ms	100	A
Gate-Emitter Voltage	V_{GES}	T_{vj}=25	± 20	V
Total Power Dissipation	P_{tot}	T_c=25 T_{vjmax}=175	288	W

- IGBT- inverter

Characteristic values

Parameter	Symbol	Conditions	Value			Unit
			Min.	Typ.	Max.	
Gate-emitter Threshold Voltage	$V_{GE(th)}$	$V_{GE}=V_{CE}$, I_C =2.0mA,T_{vj}=25	5.2	5.8	6.4	V
Collector-Emitter Cut-off Current	I_{CES}	V_{CE}=1200V,V_{GE}=0V, T_{vj}=25℃			1.0	mA
Collector-Emitter Saturation Voltage	$V_{CE(sat)}$	Ic=50A,V_{GE}=15V, T_{vj}=25		1.90	2.30	V
		Ic=50A,V_{GE}=15V, T_{vj}=125		2.30		
		Ic=50A,V_{GE}=15V, T_{vj}=150		2.40		
Gate Charge	Q_G			0.35		uC
Input Capacitance	C_{ies}	V_{CE}=25V,V_{GE} =0V, f=1MHz, T_{vj}=25℃		2.60		nF
Reverse Transfer Capacitance	C_{res}			0.10		nF
Gate-Emitter leakage current	I_{GES}	V_{CE}=0 V, V_{GE}=20V,T_{vj} = 25			400	nA
Turn-on Delay Time	$t_{d(on)}$	I_C =50 A V_{CE} = 600 V V_{GE} = ±15V R_G = 15Ω T_{vj}=25		168		ns
Rise Time	t_r			34		ns
Turn-off Delay Time	$t_{d(off)}$			320		ns
Fall Time	t_f			78		ns
Energy Dissipation During Turn-on Time	E_{on}			5.42		mJ
Energy Dissipation During Turn-off Time	E_{off}			4.15		mJ
Turn-on Delay Time	$t_{d(on)}$	I_C =50 A V_{CE} = 600 V V_{GE} = ±15V R_G = 15Ω T_{vj}=125		175		ns
Rise Time	t_r			42		ns
Turn-off Delay Time	$t_{d(off)}$			426		ns
Fall Time	t_f			148		ns
Energy Dissipation During Turn-on Time	E_{on}			7.26		mJ
Energy Dissipation During Turn-off Time	E_{off}			5.80		mJ
SC Data	I_{sc}	T_p≤10us,V_{GE}=15V,T_{vj}=150 , V_{cc}=900V,V_{CEM}≤1200V		260		A

pper
Ratings

eter	Symbol	Conditions	Value	Unit
oltage	V_{CES}	V_{GE}=0V, I_C=1mA, T_j=25	1200	V
or Current	I_C	T_c=100 , T_{vjmax}=175	35	A
llector Current	I_{CRM}	tp=1ms	70	A
ge	V_{GES}	T_{vj}=25	± 20	V
ation	P_{tot}	T_c=25 T_{vjmax}=175	227	W

s

eter

	$V_{GE(th)}$	V_{GE}=V_{CE}, I_C =1.4mA,T_{vj}=25	5.2	6.0	6.8	V
t	I_{CES}	V_{CE}=1200V,V_{GE}=0V, T				

Turn-on Delay Time	$t_{d(on)}$	I_C =35 A V_{CE} = 600 V V_{GE} = ±15V R_G = 12Ω T_{vj}=125		38		ns
Rise Time	t_r			21		ns
Turn-off Delay Time	$t_{d(off)}$			178		ns
Fall Time	t_f			170		ns
Energy Dissipation During Turn-on Time	E_{on}			2.90		mJ
Energy Dissipation During Turn-off Time	E_{off}			2.90		mJ
SC Data	I_{sc}	T_p≤10us,V_{GE}=15V,T_{vj}=150 , V_{cc}=900V,V_{CEM}≤1200V		150		A

● Diode-Brake-Chopper

Absolute Maximum Ratings

Parameter	Symbol	Conditions	Value	Unit
Repetitive Peak Reverse Voltage	V_{RRM}	T_j=25	1200	V
Continuous DC Forward Current	I_F		15	A
Repetitive Peak Forward Current	I_{FRM}	tp=1ms	30	A
I^2t-value	I^2t	V_R=0,t_p=10ms,T_j=125	48.0	A^2s
		V_R=0,t_p=10ms,T_j=150	42.0	

Characteristic values

Parameter	Symbol	Conditions	Value			Unit
			Min.	Typ.	Max.	
Forward Voltage	V_F	I_F=15A,T_{vj}=25		1.95		V
		I_F=15A,T_{vj}=125		1.80		
		I_F=15A,T_{vj}=150		1.70		
Recovered Charge	Q_{rr}	I_F =15 A V_R=600V -di_F/dt =550A/us T_{vj}=25		1.10		uC
Peak Reverse Recovery Current	I_{rr}			12.0		A
Reverse Recovery Energy	E_{rec}			0.30		mJ
Recovered Charge	Q_{rr}	I_F =15 A V_R=600V -di_F/dt =550A/us T_{vj}=125		1.90		uC
Peak Reverse Recovery Current	I_{rr}			14.0		A
Reverse Recovery Energy	E_{rec}			0.60		mJ

Diode-Rectifier

Absolute Maximum Ratings

Parameter	Symbol	Conditions	Value	Unit
Repetitive Peak Reverse Voltage	V_{RRM}	T_j=25	1600	V
Average output Current 50/60Hz, sine wave	$I_{F(AV)}$	T_c=100	50	A
Maximum RMS Current at Rectifier Output	I_{RMSM}	T_c=100	100	A
Surge Forward Current	I_{FSM}	V_R=0,t_p=10ms,T_j=45	525	A
I^2t-value	I^2t	V_R=0,t_p=10ms,T_j=45	1378	A^2s

Characteristic values

Parameter	Symbol	Conditions	Value			Unit
			Min.	Typ.	Max.	
Diode Forward Voltage	V_F	I_F=50A,T_j=125		1.0		V
Reverse Current	I_R	T_j=125 ,V_R=1600V			1.5	mA

NTC-Thermistor

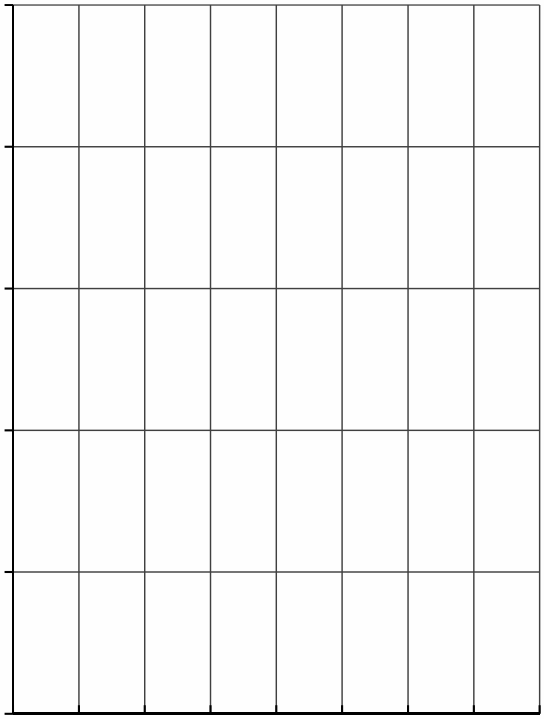
Characteristic values

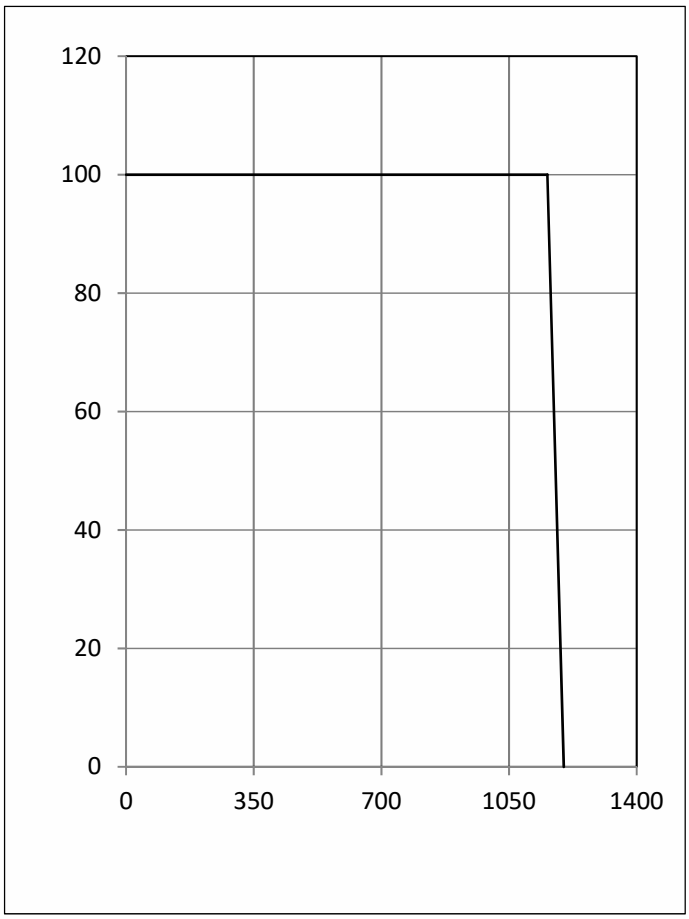
Parameter	Symbol	Conditions	Value			Unit
			Min.	Typ.	Max.	
Rated Resistance	R_{25}			5.0		kΩ
Deviation of R100	ΔR/R	T_C=100,R_{100}=493.3Ω	-5		5	%
Power Dissipation	P_{25}				20.0	mW
B-value	$B_{25/50}$	$R_2=R_{25}\exp[B_{25/50}(1/T_2-1/(298.15\ K))]$		3375		K

Module Characteristics

T_C=25°C unless otherwise specified

Parameter	Symbol	Conditions	Value			Unit
			Min.	Typ.	Max.	
Isolation voltage	V_{isol}	t=1min,f=50Hz	2500			V
Maximum Junction Temperature	T_{jmax}				175	
Operating Junction Temperature	$T_{vj\ op}$		-40		150	
Storage Temperature	T_{stg}		-40		125	
Stray-inductance-module	L_{SCE}			60		nH
Module lead resistance, terminals-chip	$R_{cc'+EE'}$	T_C=25 , per switch		4.0		mΩ
	$R_{AA'+CC'}$			3.0		

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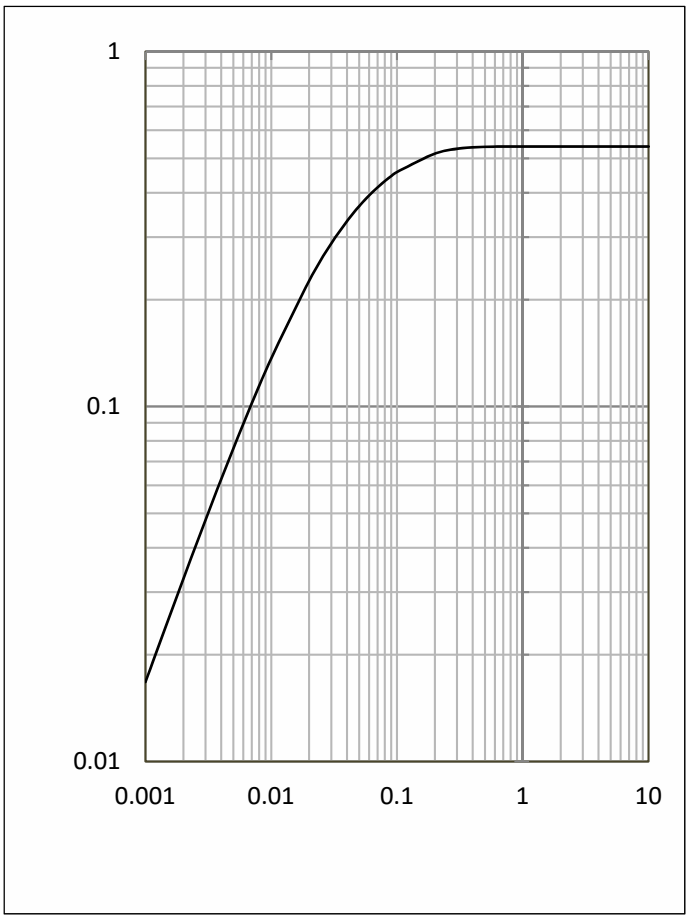
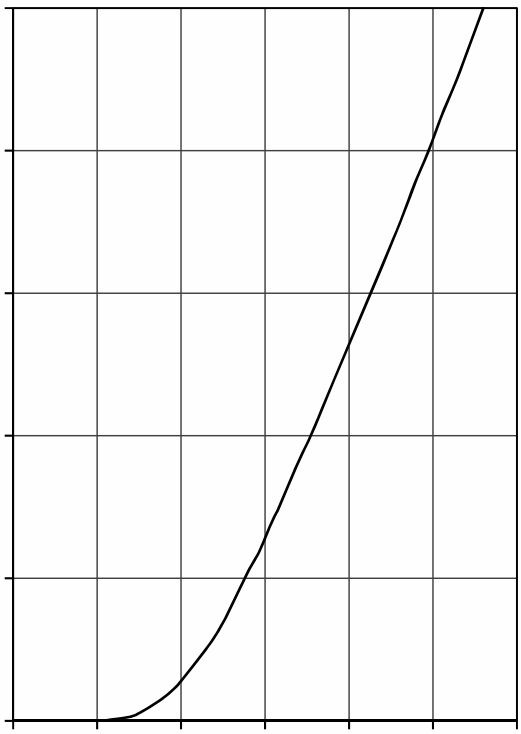
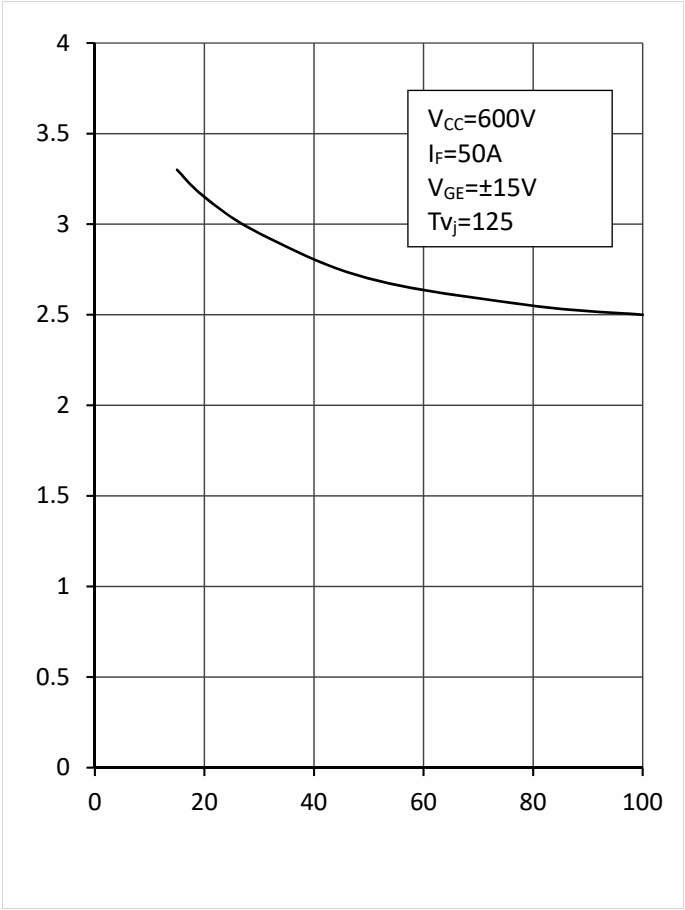
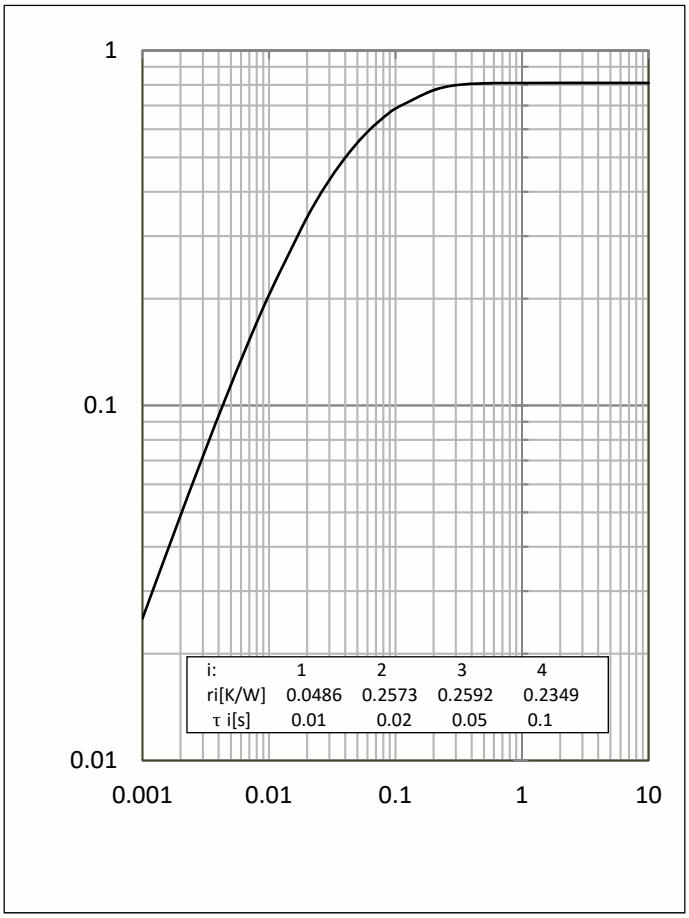
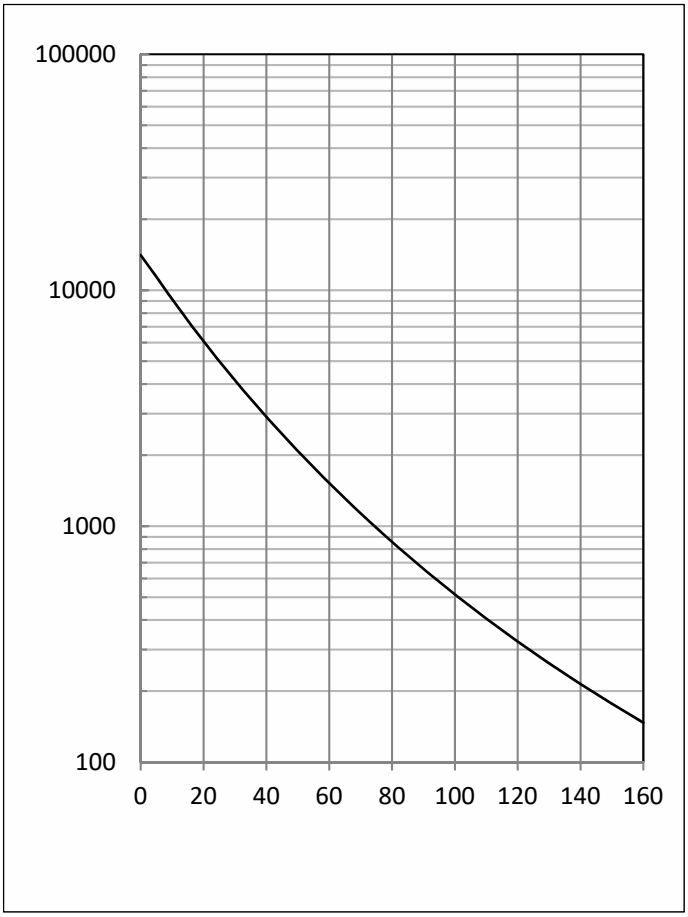
100
80
60
40
20
0
0
350
700
1050
1400

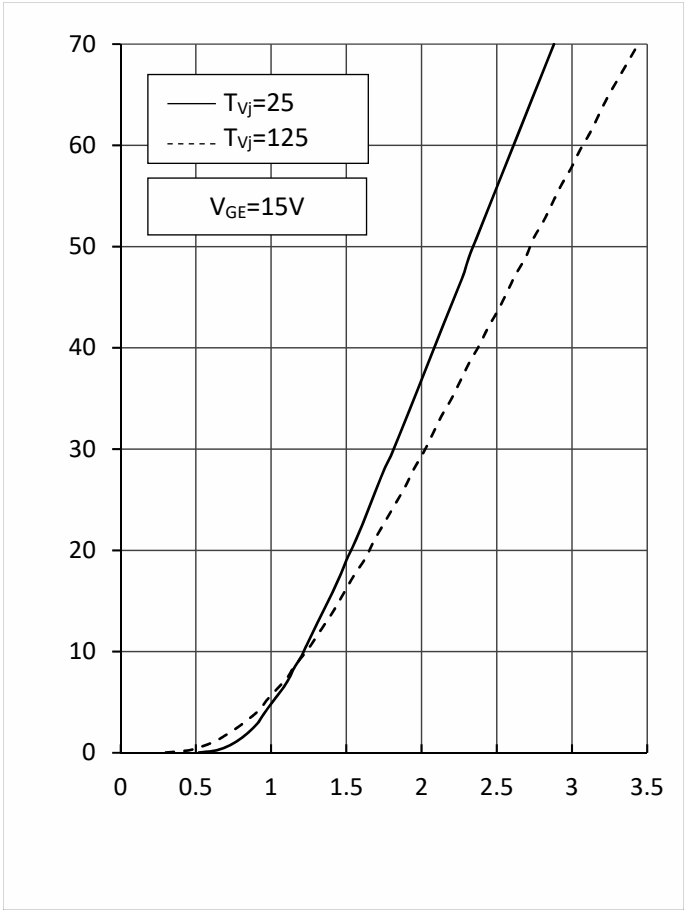

1
0.1
0.01
0.001
0.01
0.1
1
10

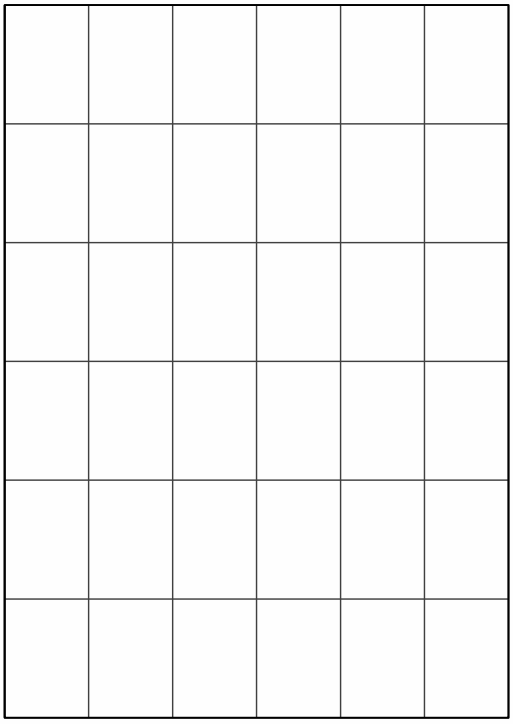



V_{CC}=600V
I_F=50A
V_{GE}=±15V
Tv_j=125
4
3.5
3
2.5
2
1.5
1
0.5
0
0
20
40
60
80
100

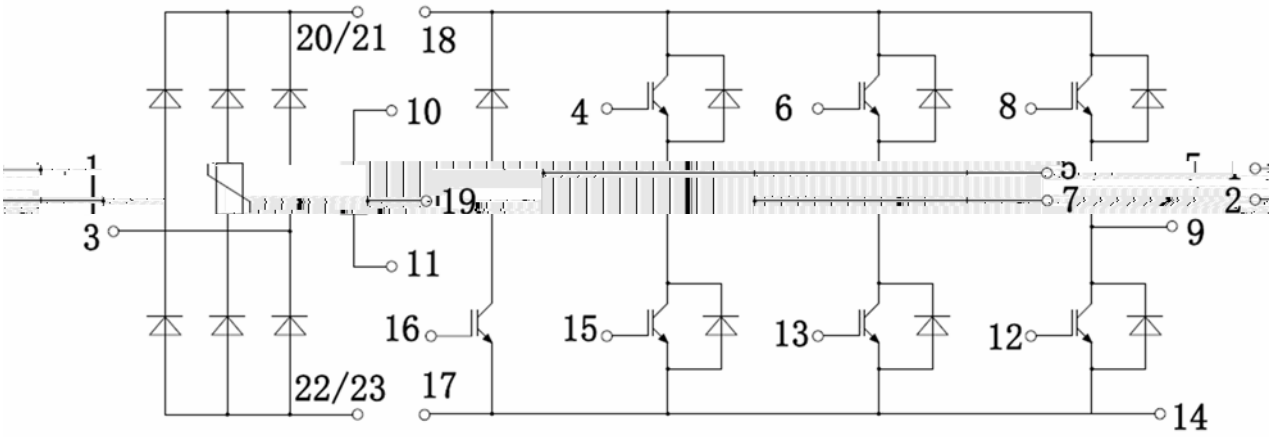

1
0.1
0.01
0.001
0.01
0.1
1
10
i: 1 2 3 4
ri[K/W] 0.0486 0.2573 0.2592 0.2349
τ i[s] 0.01 0.02 0.05 0.1


100000
10000
1000
100
0
20
40
60
80
100
120
140
160


T_{Vj}=25
T_{Vj}=125
V_{GE}=15V
70
60
50
40
30
20
10
0
0
0.5
1
1.5
2
2.5
3
3.5



- Circuit Diagram



- **Package Outline Information**