

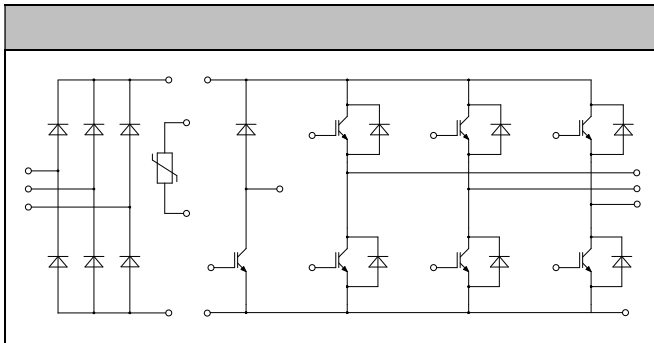


IGBT Modules

V_{CE} **120V**
I_C **40A**

Applications

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



Features

Low switching losses
Low $V_{CE(sat)}$ with positive temperature coefficient
Inductive fast & soft recovery anti-parallel FWD
Low inductance case
High short-circuit capability (10s)
Maximum junction temperature 175°C

IGBT- inverter

Absolute Maximum Ratings

Parameter	Symbol	Conditions	Value	Unit
Collector-Emitter Voltage	V_{CE}	V_{GE}=0V, I_C=1mA, T_J=25	120	V
Continuous Collector Current	I_C	T_C=100, θ_{jmax} 175	40	A
Repetitive Peak Collector Current	I_{CM}	tp=1ms	80	A
Gate-Emitter Voltage	V_{GE}	T_J=25	20	V
Total Power Dissipation	P_{tot}	T_C=25 T_{Jmax}=175	227	W



IGBT- inverter

Characteristic values

Parameter	Symbol	Conditions	Value			Unit	
			Min.	Typ.	Max.		
Gate-emitter Threshold Voltage	$V_{GE(th)}$	$V_{GE}=V_{CE}, I_C=12A, T_j=25$	52	60	68	V	
Collector-Emitter Cut-off Current	I_{CS}	$V_{CE}=120V, V_{GE}=0V, T_j=25C$			10	nA	
Collector-Emitter Saturation Voltage	$V_{CE(sat)}$	$I_C=4A, V_{GE}=15V, T_j=25$		190	230	V	
		$I_C=4A, V_{GE}=15V, T_j=125$		220			
		$I_C=4A, V_{GE}=15V, T_j=150$		240			
Gate Charge	Q_g			035		μC	
Input Capacitance	C_{is}	$V_{CE}=25V, V_{GE}=0V$		225		rF	
Reverse Transfer Capacitance	C_{es}	$f=1MHz, T_j=25C$		010		rF	
Gate-Emitter leakage current	I_{GS}	$V_{CE}=0V, V_{GE}=20V, T_j=25$			40	nA	
Turn-on Delay/line	t_{on}	$I_C=40A$ $V_{CE}=600V$ $V_{GE}=\pm 15V$ $R_g=13$ $T_j=25$		198		ns	
Rise time	t_r			21		ns	
Turn-off Delay/line	t_{off}			330		ns	
Fall time	t_f			72		ns	
Energy Dissipation During Turn-on	E_{on}			425		nJ	
Energy Dissipation During Turn-off	E_{off}			200		nJ	
Turn-on Delay/line	t_{on}		$I_C=40A$ $V_{CE}=600V$ $V_{GE}=\pm 15V$ $R_g=13$ $T_j=125$		210		ns
Rise time	t_r				28		ns
Turn-off Delay/line	t_{off}				40		ns
Fall time	t_f				90		ns
Energy Dissipation During Turn-on	E_{on}			604		nJ	
Energy Dissipation During Turn-off	E_{off}			305		nJ	
SCData	I_c	$T_p=10s, V_{GE}=15V, T_j=150, V_{CE}=90V, V_{CEM}=120V$			200		A



Diode-inverter

Absolute Maximum Ratings

Parameter	Symbol	Conditions	Value	Unit
Repetitive Peak Reverse Voltage	V_{RRM}	$T_j=25$	120	V
Continuous DC Forward Current	I_F		40	A
Repetitive Peak Forward Current	I_{FRM}	$t_F=1ms$	80	A
R _{th(j-c)}	R_{th}	$V_F=0, t_F=10ms, T_j=125$	20	K/s
		$V_F=0, t_F=10ms, T_j=150$	20	

Characteristic values

Parameter	Symbol	Conditions	Value			Unit
			Min.	Typ.	Max.	
Forward Voltage	V_F	$I_F=40A, T_j=25$		190	225	V
		$I_F=40A, T_j=125$		190		
		$I_F=40A, T_j=150$		185		
Recovered Charge	Q_r	$I_F=40A$		415		uC
Peak Reverse Recovery Current	I_{rr}	$V_R=60V$ $-di/dt=160A/\mu s$		42		A
Reverse Recovery Energy	E_{rr}	$T_j=25$		130		nJ
Recovered Charge	Q_r	$I_F=40A$		800		uC
Peak Reverse Recovery Current	I_{rr}	$V_R=60V$ $-di/dt=160A/\mu s$		46		A
Reverse Recovery Energy	E_{rr}	$T_j=125$		23		nJ



IGBT-brake-chopper Absolute Maximum Ratings

Parameter	Symbol	Conditions	Value	Unit
Collector-Emitter Voltage	V_{CES}	$V_{GE}=0V, I_C=1mA, T_j=25$	120	V
Continuous Collector Current	I_C	$T_c=100, \text{ max } 175$	25	A
Repetitive Peak Collector Current	I_{CRM}	$t_p=1ms$	50	A
Gate-Emitter Voltage	V_{GES}	$T_j=25$	20	V
Total Power Dissipation	P_{tot}	$T_c=25, T_{jmax}=175$	166	W

Characteristic values

Parameter	Symbol	Conditions	Value			Unit
			Min.	Typ.	Max.	
Gate-emitter Threshold Voltage	$V_{GE(th)}$	$V_{GE}=V_{CE}, I_C=12mA, T_j=25$	52	60	68	V
Collector-Emitter Cut-off Current	I_{CES}	$V_{CE}=120V, V_{GE}=0V, T_j=25C$			10	nA
Collector-Emitter Saturation Voltage	$V_{CE(sat)}$	$I_C=25A, V_{GE}=15V, T_j=25$		190	230	V
		$I_C=25A, V_{GE}=15V, T_j=125$		220		
		$I_C=25A, V_{GE}=15V, T_j=150$		230		
Gate Charge	Q_g			021		nC
Input Capacitance	C_{iss}	$V_{CE}=25V, V_{GE}=0V, f=1MHz, T_j=25C$		160		nF
Reverse Transfer Capacitance	C_{res}			007		nF
Gate-Emitter Leakage current	I_{GES}	$V_{GE}=0V, V_{CE}=20V, T_j=25$			100	nA
Turn-on Delay/line	$t_{(on)}$	$I_C=25A, V_{CE}=60V, V_{GE}=\pm 15V, R_{\theta c}=18, T_j=25$		175		ns
Rise time	t_r			38		ns
Turn-off Delay/line	$t_{(off)}$			40		ns
Fall time	t_f			65		ns
Energy Dissipation During Turn-on/line	E_{on}			195		nJ
Energy Dissipation During Turn-off/line	E_{off}			120		nJ



TurnonDelay/line	t_{on}	$I_C=25A$ $V_{CE}=60V$ $V_{GE}=\pm 15V$ $R_G=18$ $T_J=125$	185	ns
RiseTime	t_r		43	ns
TurnoffDelay/line	t_{off}		510	ns
FallTime	t_f		120	ns
Energy Dissipation During Turnon/line	E_{on}		260	nJ
Energy Dissipation During Turnoff/line	E_{off}		200	nJ
SCData	I_C		$T_P=10\mu s, V_{CE}=15V, T_J=150$, $V_{CE}=90V, V_{CEM} 120V$	135

Diode-Brake-Chopper

Absolute Maximum Ratings

Parameter	Symbol	Conditions	Value	Unit
RepetitivePeakReverseVoltage	V_{RRM}	$T_J=25$	120	V
ContinuousDCForwardCurrent	I_F		15	A
RepetitivePeakForwardCurrent	I_{FRM}	$t_p=1ns$	30	A
Rvalue	R_{θ}	$V_{CE}=0, t_p=10ns, T_J=125$	480	As
		$V_{CE}=0, t_p=10ns, T_J=150$	420	

Characteristic values

Parameter	Symbol	Conditions	Value			Unit
			Min.	Typ.	Max.	
ForwardVoltage	V_F	$I_F=15A, T_J=25$		200	240	V
		$I_F=15A, T_J=125$		210		
		$I_F=15A, T_J=150$		210		
RecoveredCharge	Q_r	$I_F=15A$		110		uC
PeakReverseRecoveryCurrent	I_{rr}	$V_{CE}=60V$ $-d_f/d=50A\mu s$		120		A
ReverseRecoveryEnergy	E_{rec}	$T_J=25$		030		nJ
RecoveredCharge	Q_r	$I_F=15A$		190		uC
PeakReverseRecoveryCurrent	I_{rr}	$V_{CE}=60V$ $-d_f/d=50A\mu s$		140		A
ReverseRecoveryEnergy	E_{rec}	$T_J=125$		060		nJ



Diode-Rectifier

Absolute Maximum Ratings

Parameter	Symbol	Conditions	Value	Unit
Repetitive Peak Reverse Voltage	V_{RRM}	$T_J=25$	160	V
Average Output Current 50kHz, sine wave	$I_{(AV)}$	$T_C=100$	50	A
Minimum RMS Current at Rectifier Output	I_{RSM}	$T_C=100$	60	A
Surge Forward Current	I_{SM}	$V_F=0, t_F=10ms, T_J=25$	300	A
Reverse Recovery Time	t_r	$V_F=0, t_F=10ms, T_J=25$	500	ns

Characteristic values

Parameter	Symbol	Conditions	Value			Unit
			Min.	Typ.	Max.	
Diode Forward Voltage	V_F	$I_F=40A, T_J=25$		112		V
Reverse Current	I_R	$T_J=25, V_R=160V$			20	mA

NTC-Thermistor

Characteristic values

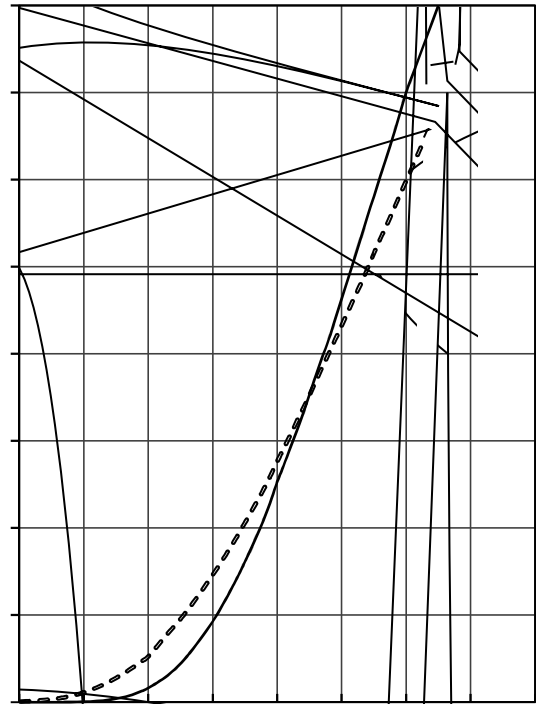
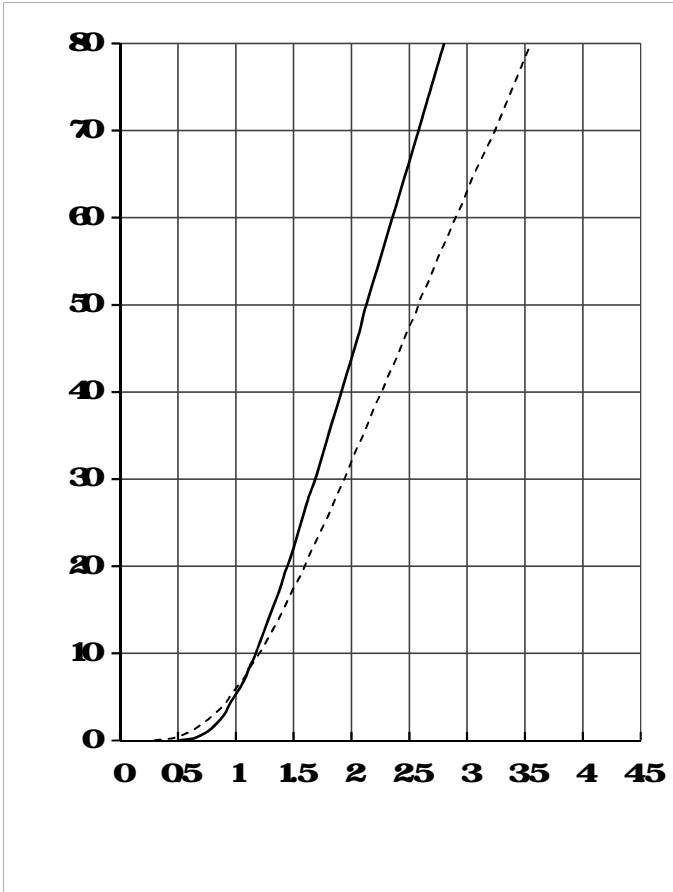
Parameter	Symbol	Conditions	Value			Unit
			Min.	Typ.	Max.	
Rated Resistance	R_{25}			50		k
Deviation of R100	RR	$T_C=100, R_{100}=483$	-5		5	%
Power Dissipation	P_{25}				200	mW
B value	$B_{25/100}$	$R_2 = R_1 \exp(B_{25/100} (1/T_2 - 1/298.15))$		335		K



Module Characteristics

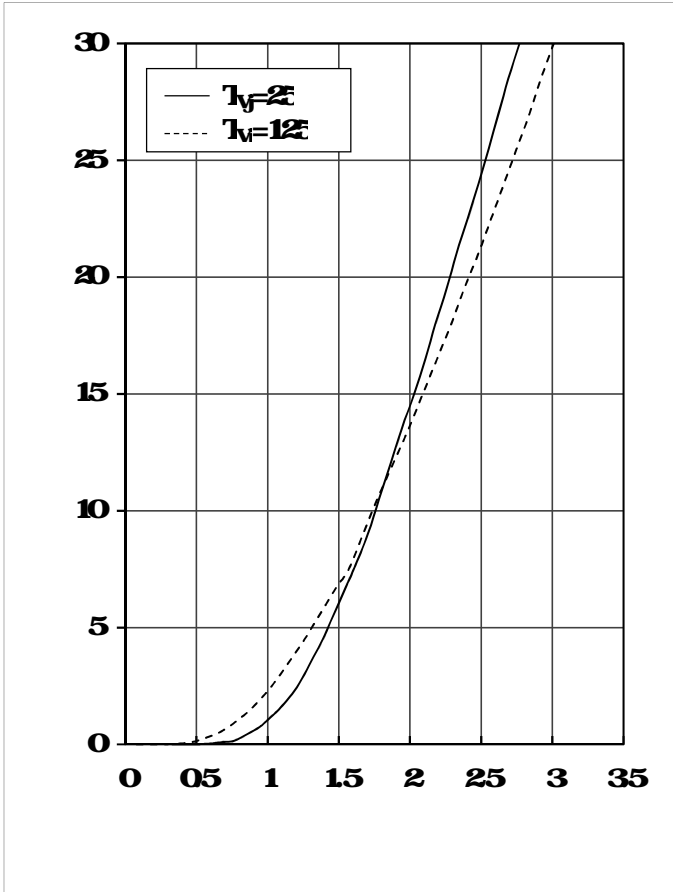
 $T_C=25^{\circ}\text{C}$ unless otherwise specified

Parameter	Symbol	Conditions	Value			Unit
			Min.	Typ.	Max.	
Isd	V_{sd}	$t=1\text{min}, f=50\text{Hz}$	250			V
Minimum Junction Temperature	$T_{j\text{min}}$				175	
Quasi Junction Temperature	$T_{j\text{qp}}$		-40		150	
Storage Temperature	T_{stg}		-40		125	$^{\circ}$
Storage Current	I_{scE}			6		



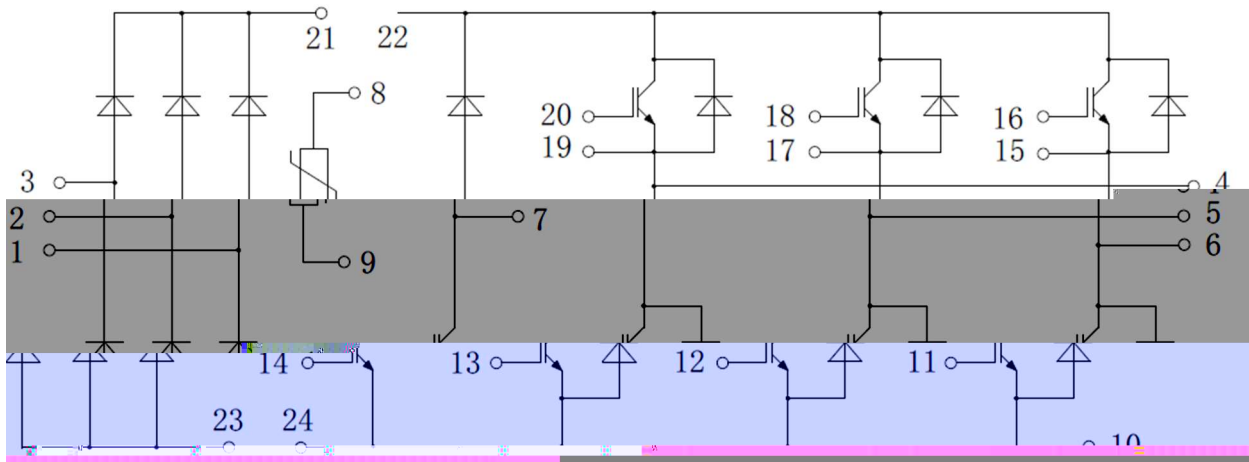


MG40P12E1





Circuit Diagram



Dimensions in Millimeters

