6MBP20RH060

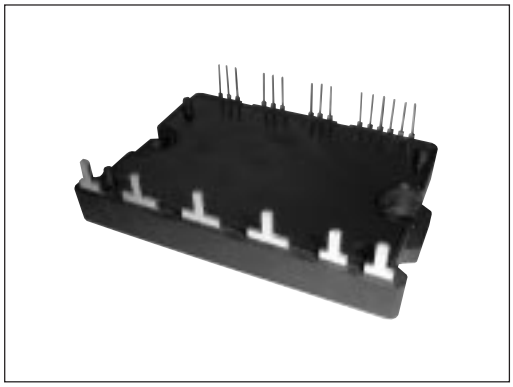
IGBT Modules

IGBT-IPM R series

600V / 20A / 6 in one-package

■ Features

- Low power loss and soft switching
- High performance and high reliability IGBT with overheating protection
- Higher reliability because of a big decrease in number of parts in built-in control circuit



■ Applications

- Inverter for motor drive
- AC and DC servo drive amplifier
- UPS (Uninterruptible power supply)

■ Maximum ratings and characteristics

● **Absolute maximum ratings** (Tc=25˚C unless otherwise specified)

Item		Symbol	Rating	Unit
DC bus voltage		V_{DC}	450	V
DC bus voltage (Surge)		$V_{DC\ (surge)}$	500	V
DC bus voltage (Short operating)		V_{SC}	400	V
Collector-Emitter voltage		V_{CES}	600	V
Collector current	DC	I_C	20	A
	1ms	I_{CP}	40	A
	Duty=49.6%	$-I_C$	20	A
Collector power dissipation	One transistor	P_C	63	W
Junction temperature		T_j	150	˚C
Input voltage of power supply for pre-driver		V_{CC}	–0.3 to 20	V
Input signal voltage		V_{in}	Vz	V
Input singal current		I_{in}	1	mA
Alarm signal voltage		V_{ALM}	Vcc	V
Alarm signal current		I_{ALM}	15	mA
Storage temperature		T_{stg}	–40 to 125	˚C
Operating case temperature		T_{cop}	–20 to 100	˚C
Isolating voltage (Terminal to base, 50/60Hz sine wave 1min.)		V_{iso}	AC 2500	V
Screw torque		Mounting (M4)	2.0	N • m

● **Electrical characteristics of power circuit** (Tc=Tj=25˚C, Vcc=15V)

Item	Symbol	Condition	Min.	Typ.	Max.	Unit
Collector current at off signal input	I_{CES}	V_{CE}=600V, Vin open	–	–	1.0	mA
Collector-Emitter saturation voltage	$V_{CE\ (sat)}$	Ic=20A	–	–	2.7	V
Forward voltage of FWD	V_F	–Ic=20A	–	–	3.5	V

● **Electrical characteristics of control circuit** (Tc=Tj=25˚C, Vcc=15V)

Item	Symbol	Condition	Min.	Typ.	Max.	Unit
Power supply current of P-line pre-driver (one unit)	I_{CCP}	V_{in}=H	–	2.0	5.0	mA
Power supply current of N-line pre-driver	I_{CCN}	V_{in}=H	–	4.0	10.0	mA
Input signal threshold voltage	$V_{In\ (th)}$	T_{urn-on}	1.00	1.35	1.70	V
		$T_{urn-off}$	1.25	1.60	1.95	V
Input zener voltage	V_Z	R_{in}=20kΩ	–	8.0	–	V
IGBT chips overheat protection temperature level	T_{joH}	Surface of IGBT	150	–	–	˚C
Hysteresis	T_{jH}		–	20	–	˚C
Collector current protection level	I_{OC}	N-side, (N1-N2 open)	30	37	44	A
	V_{OC}	Between N1 and N2	190	200	210	mV
OC detecting resistance value	R_{OC}		–	5.4	–	mΩ
Protection delay time	t_{DOC}	Tj=25˚C Fig. 1, Fig. 2	–	5.0	7.0	µs
Undervoltage protection level	V_{UV}		11.0	–	12.5	V
Hysteresis	V_H		0.2	–	0.8	V
Alarm signal hold time	t_{ALM}		1.0	2.0	–	ms

● **Switching characteristics** (Tc=Tj=25˚C, Vcc=15V)

Item	Symbol	Condition	Min.	Typ.	Max.	Unit
Switching time (IGBT) See Fig. 3	t_{on}	Ic=20A, V_{DC}=300V	0.5	–	–	µs
	t_{off}	Inductive-Load	–	–	3.5	µs
Switching time (FWD)	t_{rr}		–	–	0.5	µs

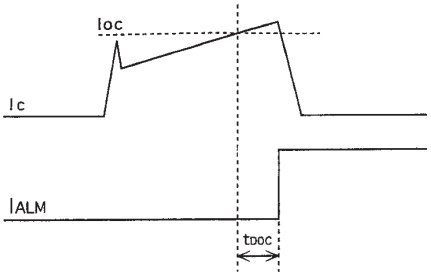


Fig.1 Definition of OC delay time

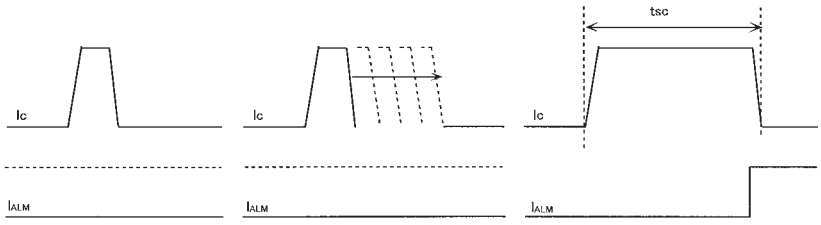


Fig.2 Definition of tsc

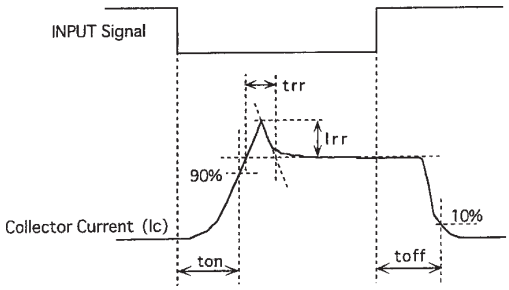


Fig.3 Definition of switching time

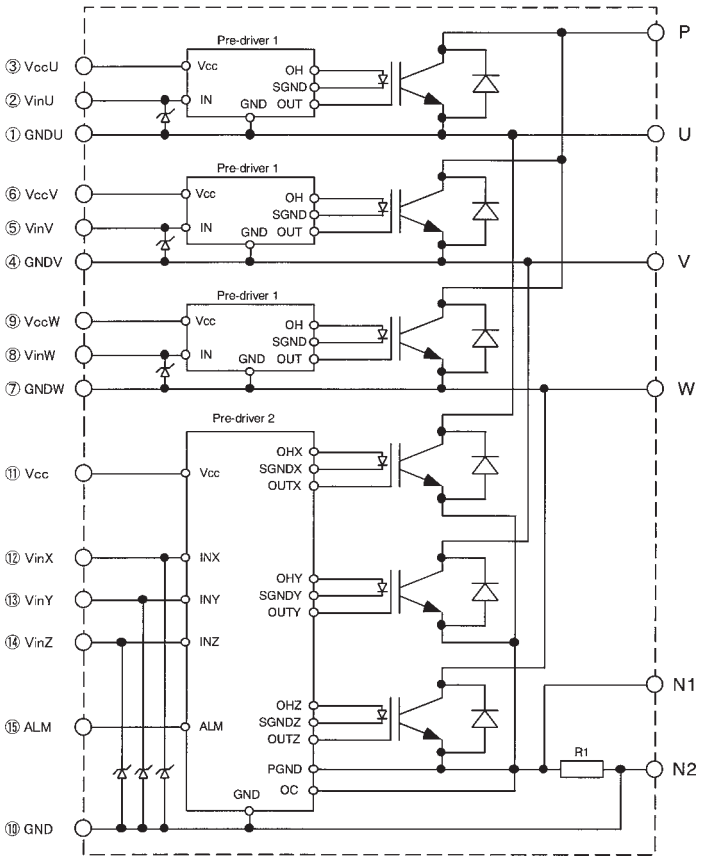
● **Thermal characteristics** (Tc=Tj=25˚C, Vcc=15V)

Item		Symbol	Min.	Typ.	Max.	Unit
Junction to case thermal resistance	IGBT	Rth (j-c)	–	–	2.0	˚C/W
	FWD	Rth (j-c)	–	–	3.6	˚C/W
Case to fin thermal resistance with compound		Rth (c-f)	–	0.05	–	˚C/W

● **Recommendable value**

Item	Symbol	Min.	Typ.	Max.	Unit
DC bus voltage	V_{DC}	200	–	400	V
Operating power supply voltage range of pre-drive	V_{CC}	13.5	15	16.5	V
Switching frequency	f_{sw}	1	–	20	kHz
Flatness of heat sink	–	–100	–	100	µm
Mounting screw torque (M4)	–	1.3	–	1.7	N • m

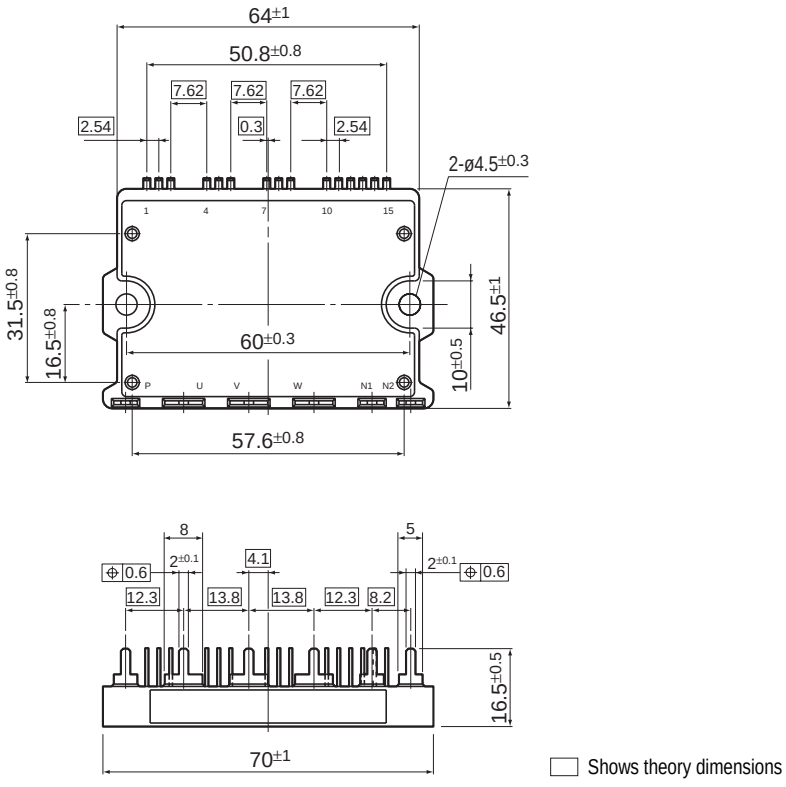
■ Block diagram



Pre-driver 1 includes following functions. (P-side)
- Amplifier for drive
- Power supply undervoltage protection
- IGBT chip overheating protection

Pre-driver 2 includes following functions. (N-side)
- Amplifier for drive
- Power supply undervoltage protection
- IGBT chip overheating protection
- Overcurrent protection
- Alarm signal output

■ Outline drawings, mm



Shows theory dimensions

Mass: 50g