6MBP75VBA060-50(P626: 75A/600V)
Specifications (tentative)

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Fuji Electric Systems Co., Ltd.
Module Development Dept.
IPM Sect.

Approved	Checked	Drawn
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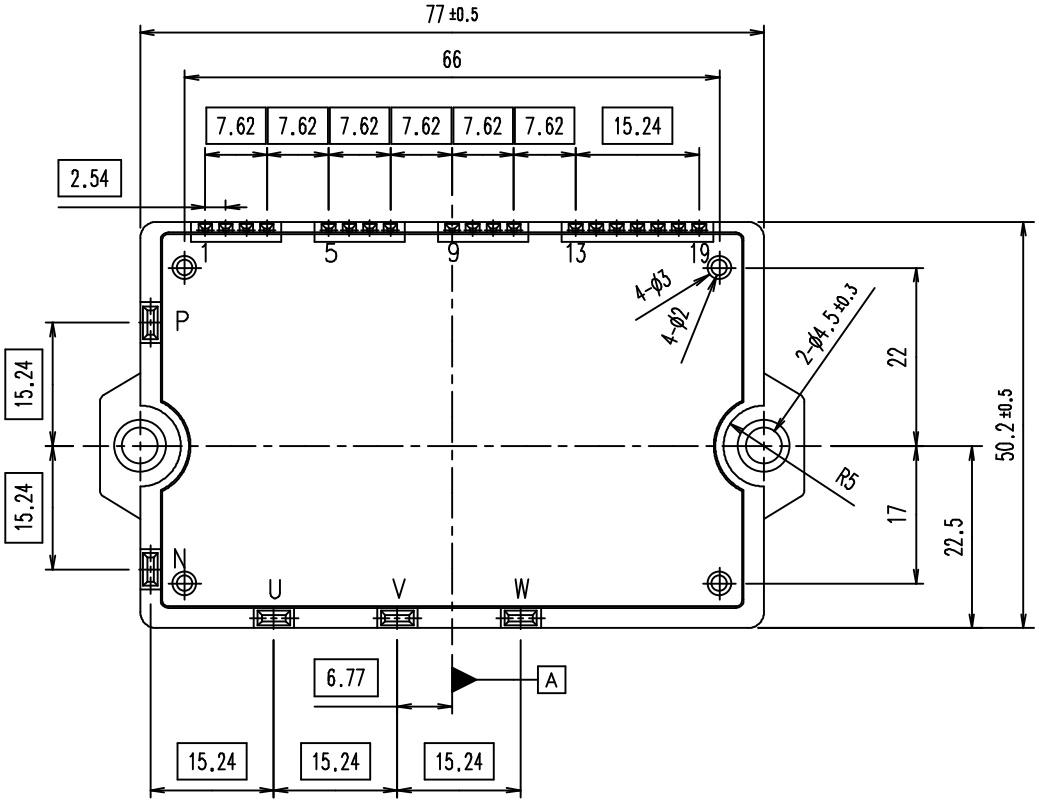
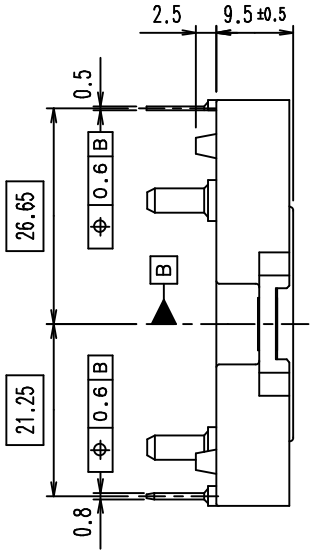
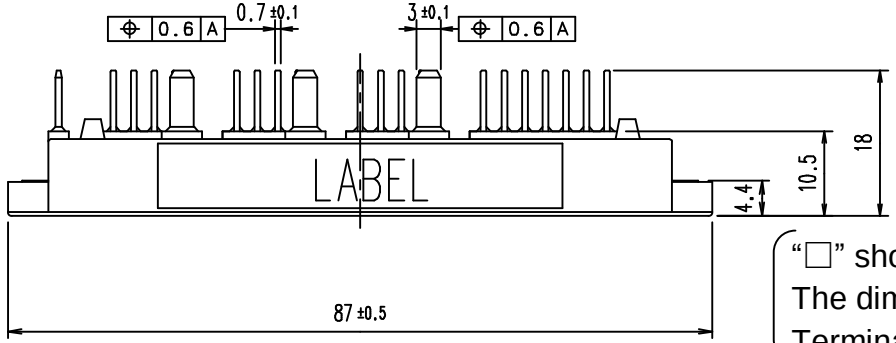
P626 package outline drawing



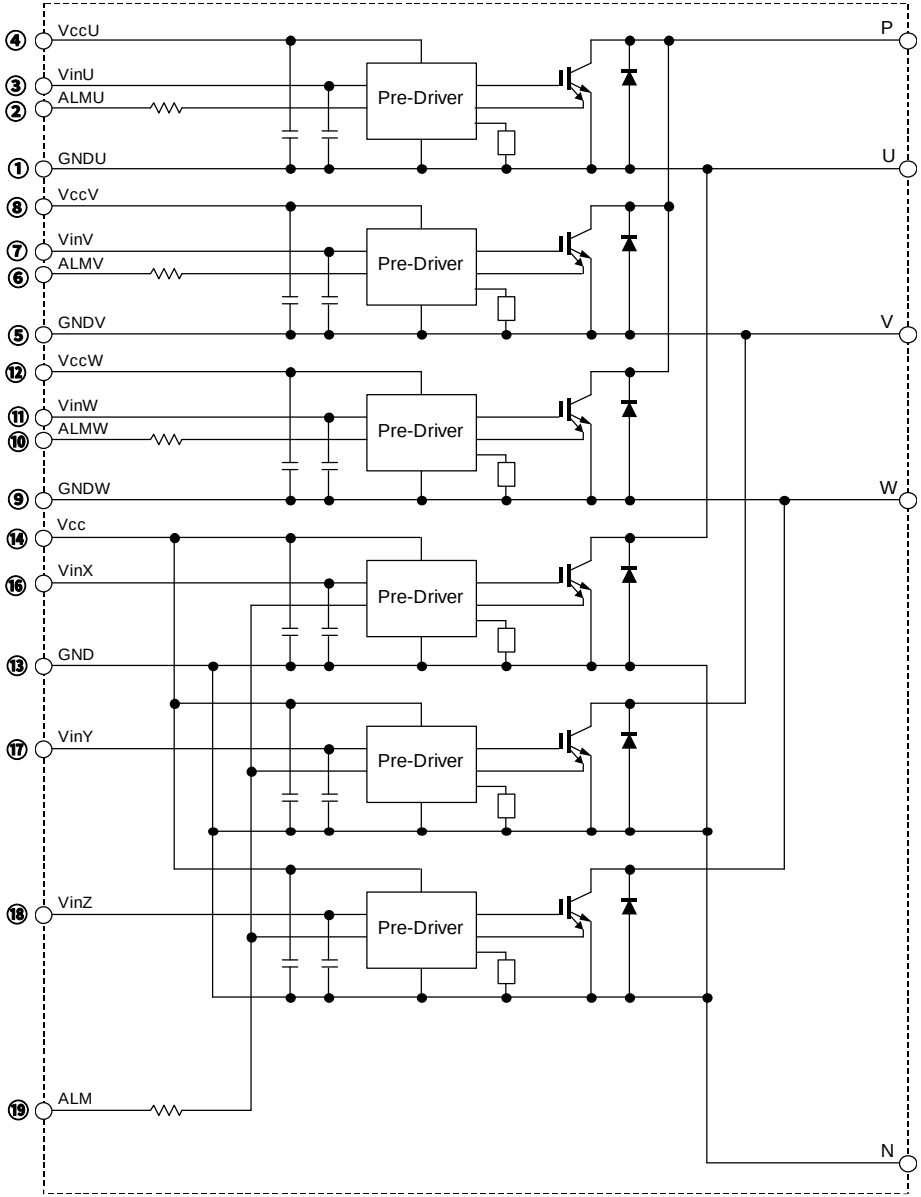




Indication on module
Display on the module label
-Label of production
-Type name: 6MBP75VBA060-50
-Ic, Vces rating: 75A, 600V
-Lot No.
-Place of manufacturing (Code)
-Data matrix code

"□" shows theoretical dimension.
The dimension of the terminals are defined at the bottom.
Terminal: SnCu plating

P626 package block diagram



Pre-drivers include following functions

1. Amplifier for driver
2. Short circuit protection
3. Under voltage lockout circuit
4. Over current protection
5. IGBT chip over heating protection

P626 package pin description

Main circuit

Symbol	Description
P	Positive input supply voltage.
U	Output (U).
V	Output (V).
W	Output (W).
N	Negative input supply voltage.

Control circuit

No.	Symbol	Description
①	GNDU	High side ground (U).
②	ALMU	Alarm signal output (U).
③	VinU	Logic input for IGBT gate drive (U).
④	VccU	High side supply voltage (U).
⑤	GNDV	High side ground (V).
⑥	ALMV	Alarm signal output (V).
⑦	VinV	Logic input for IGBT gate drive (V).
⑧	VccV	High side supply voltage (V).
⑨	GNDW	High side ground (W).
⑩	ALMW	Alarm signal output (W).
⑪	VinW	Logic input for IGBT gate drive (W).
⑫	VccW	High side supply voltage (W).
⑬	GND	Low side ground.
⑭	Vcc	Low side supply voltage.
⑮	-	No contact.
⑯	VinX	Logic input for IGBT gate drive (X).
⑰	VinY	Logic input for IGBT gate drive (Y).
⑱	VinZ	Logic input for IGBT gate drive (Z).
⑲	ALM	Low side alarm signal output.

Absolute maximum rating

Tj=25℃、Vcc=15V unless otherwise specified

Absolute maximum rating

Items			Symbol	Conditions	Min.	Max.	Unit
Power parts	Collector-Emitter voltage		Vces	Terminal P-U,V,W or U,V,W-N	-	600	V
	Junction temperature		Tj		-	150	℃
	Inverter	Collector current	Ic	DC	-	75	A
			Icp	1ms	-	150	A
			-Ic	(Duty=74.7%) *1	-	75	A
		Collector power dissipation	Pc	one transistor *2	-	198	W
	Short-circuit voltage		Vsc	Terminal P to N	200	400	V
Controll parts	Supply voltage of pre-driver		Vcc	VccU-GNDU, VccV-GNDV, VccW-GNDW Vcc-GND	-0.5	20	V
	Input signal voltage		Vin	VinU-GNDU, VinV-GNDV, VinW-GNDW VinX VinY VinZ VinDB-GND	-0.5	Vcc+0.5	V
	Alarm signal voltage		VALM	Terminal ALM to GND	-0.5	Vcc	V
	Alarm signal current		IALM	Input current to ALM terminal	-	20	mA
IPM	Operating case temperature		Topr		-20	110	℃
	Storage temperature		Tstg		-40	125	℃
	Isolating voltage		Viso	Case to main terminal 50/60Hz sine wave 1mm	-	AC2500	Vrms
	Screw torque		—	Mounting (M4)	-	1.7	Nm

Notes *1: Duty = 125/Rth(j-c)D/(Ic×Vfmax)×100 = 125/0.97/(75∗2.3)*100=74.7%

*2: Pc = 125/Rth(j-c)Q = 125/0.63=198W (Inverter part)

Electrical Characteristics

Tj=25℃、Vcc=15V unless otherwise specified

Main Circuit

Items		Symbol	Condition		Min.	Typ.	Max.	Unit
Inverter	Collector Current at off signal input	ICES	VCE=600V Vin terminal open		-	-	1.0	mA
	Collector-Emitter saturation voltage	VCE(sat)	Ic=75A	Terminal	-	-	1.9	V
	Forward voltage of FWD	VF	IF=75A	Terminal	-	-	2.3	V
Switching time		ton	Ic=75A	Tj=125°C	1.1	-	-	μs
		toff	VCE=300V	Tj=125°C	-	-	2.1	μs
		trr	IF=75A		-	-	0.3	μs
		tdead	Tj = 125°C		1.0	-	-	μs

Control circuit

Items	Symbol	Condition			Min.	Typ.	Max.	Unit
Supply current	Iccp	fsw = 0～15kHz *3			-	-	15	mA
	Iccn	Tc = -20～110°C		(Iccp: per one unit)	-	-	45	mA
Input signal threshold voltage	Vinth(on)	VinU, VinV, VinW		ON	1.2	1.4	1.6	V
	Vinth(off)	VinX, VinY, VinZ, VinDB		OFF	1.5	1.7	1.9	V
Alarm signal hold time	tALM(OC)	ALM-GND		Over current	1.0	2.0	2.4	ms
	tALM(UV)	Tc = -20～110°C	Vcc≧10V	Under voltage	2.5	4.0	4.9	ms
	tALM(TjOH)			IGBT chips over heating	5.0	8.0	11.0	ms
Resistance for current limit	RALM				960	-	1570	Ω

Notes

*3: Switching frequency of IGBT

Electrical Characteristics

Tj=25℃、Vcc=15V unless otherwise specified

Protection circuit

Items		Symbol	Condition	Min.	Typ.	Max.	Unit
Over current	Protection current level	Ioc	Tj=125℃	113	-	-	A
	Delay time	tdoc	Tj=125℃	-	5	-	μs
IGBT chips over heating	Protection temperature level	TjOH	Surface of every IGBT chip.	150	-	-	℃
	Protection hysteresis	TjH		-	20	-	℃
Unde voltage	Protection level	VUV	VccU, VccV, VccW, Vcc	11.0	-	12.5	V
	Protection hysteresis	VH		0.2	0.5	-	V

Tj=25℃、Vcc=15V unless otherwise specified

Thermal characteristics

Items			Symbol	Min.	Typ.	Max.	Unit
Junction to case Thermal resistance *4	Inverter	IGBT	Rth(j-c)Q	-	-	0.63	℃/W
		FWD	Rth(j-c)D	-	-	0.97	℃/W
Case to Fin thermal resistance with compound			Rth(c-f)	-	0.05	-	℃/W

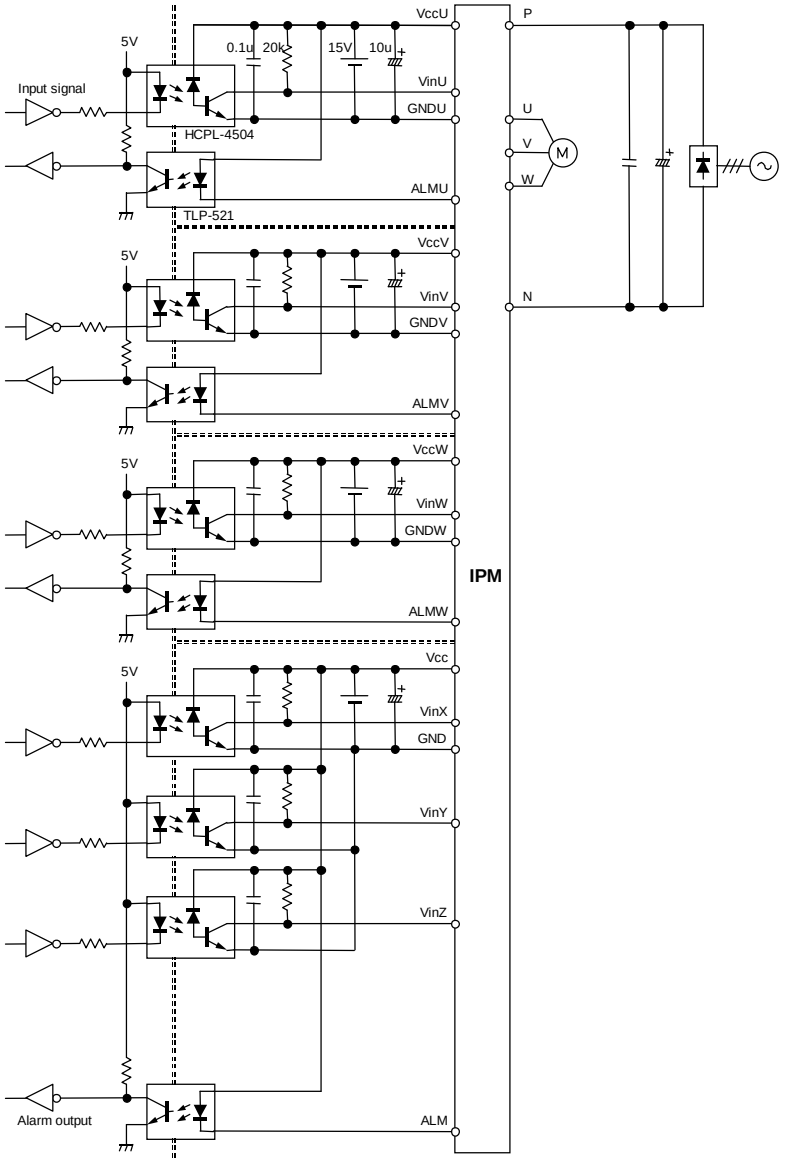
*4:Case is under the device.

Recommended operating conditions

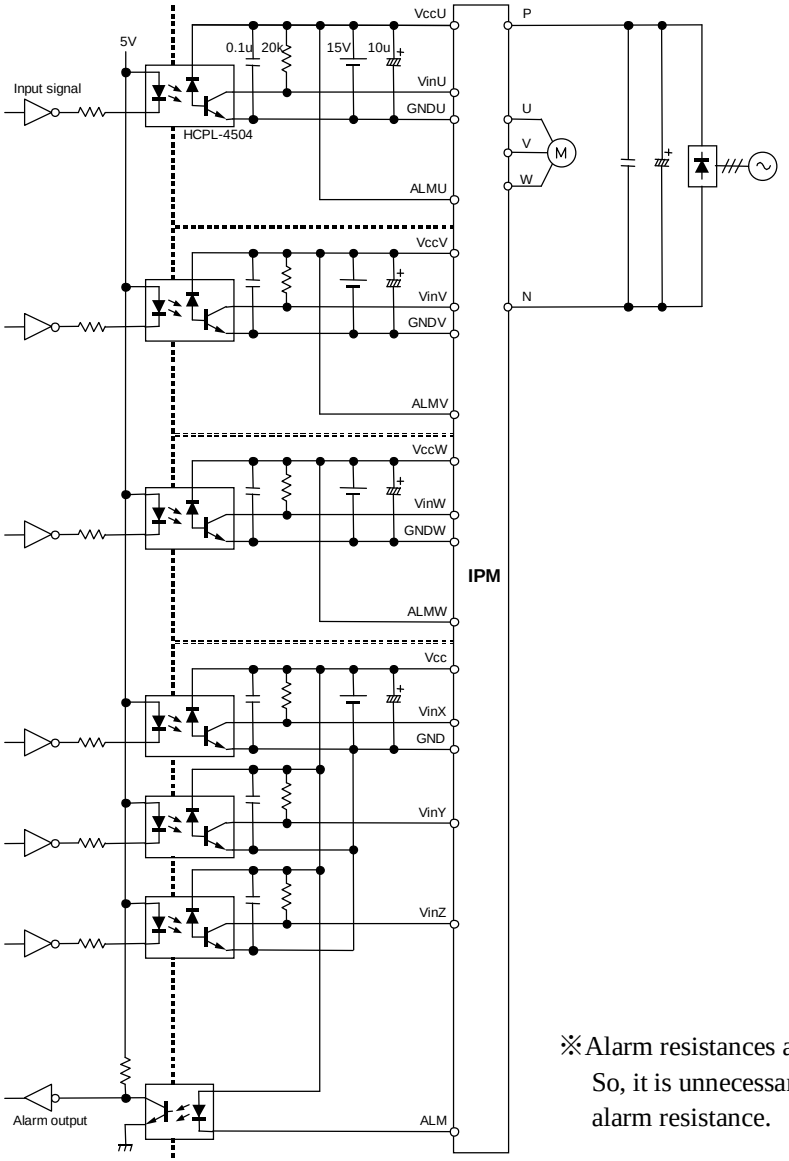
Items	Symbol	Min.	Typ.	Max.	Unit
DC bus voltage	VDC	-	-	400	V
Power supply voltage of pre-driver	Vcc	13.5	15.0	16.5	V
Screw torque (M4)	-	1.3	-	1.7	Nm

Examples of application circuit

Use of high-side alarm



Disuse of high-side alarm



※Alarm resistances are inside IPM.
So, it is unnecessary to prepare alarm resistance.

Cautions for design and application

(1) Trace routing layout should be designed with particular attention to least stray capacity between the primary and secondary sides of optical isolators by minimizing the wiring length between the optocouplers and the IPM input terminals as possible.

(2) Capacitor should be installed to Vcc-GND terminal of high-speed opt-coupler closely as much as possible.

(3) For the high-speed optocoupler, use high-CMR type one with tpHL, tpLH ≦ 0.8μs.

(4) For the alarm output circuit, use low-speed type optocoupler with CTR ≧ 100%.

(5) For the control power Vcc, use four power supplies isolated each. Connect the aluminum electrolytic capacitors(50V,10uF) to the supply voltage Vcc terminal of the IPM as close to as possible.Don`t use the single power supply such as bootstrap and so on. It may occur the malfunction by the fluctuation of the power supply voltage.

(6) Suppress surge voltages as possible by reducing the inductance between the DC bus P and N, and connecting some capacitors between the P and N terminals.

(7) To prevent noise intrusion from the AC lines, connect a capacitor of some 4700pF between the three-phase lines each and the ground.

(8) At the external circuit, never connect the control terminal GNDU to the main terminal U-phase, GNDV to V-phase, GNDW to W-phase, and GND to N-phase. Otherwise, malfunctions may be caused.

(9) Take note that an optical isolator's response to the primary input signal becomes slow if a capacitor is connected between the input terminal and GND.

(10) Taking the used isolator's CTR into account, design with a sufficient allowance to decide the primary forward current of the optical isolator.

Cautions for design and application

(11) In case of mounting this product on cooling fin, use thermal compound to secure thermal conductivity. If the thermal compound amount was not enough or its applying method was not suitable, its spreading will not be enough, then, thermal conductivity will be worse and thermal run away destruction may occur. Confirm spreading state of the thermal compound when its applying to this product. (Spreading state of the thermal compound can be confirmed by removing this product after mounting.)

(12) Use this product with keeping the cooling fin's flatness between screw holes within 50um at 100mm and the roughness within 10um. Also keep the tightening torque within the limits of this specification. Too large convex of cooling fin may cause isolation breakdown and this may lead to a critical accident. On the other hand, too large concave of cooling fin makes gap between this product and the fin bigger, then, thermal conductivity will be worse and over heat destruction may occur.

(13) This product is designed on the assumption that it applies to an inverter use. Sufficient examination is required when applying to a converter use. Please contact Fuji Electric Systems Co.,Ltd if you would like to applying to converter use.

(14) There is thermal interference between nearby power devices,because the P626 is a compact package. Therefore you measure the case temperature just under the IGBT chips and estimate the chip temperature.

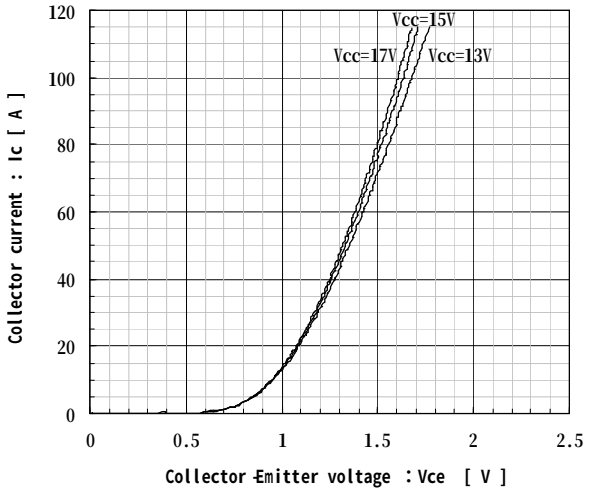
(15) The assurance of solderability in IPM is within once.Soldering in more than twice is out of quality assurance.

(16) Please see the 『IGBT-IPM APPLICATION MANUAL』and『IGBT MODULES APPLICATION MANUAL』.

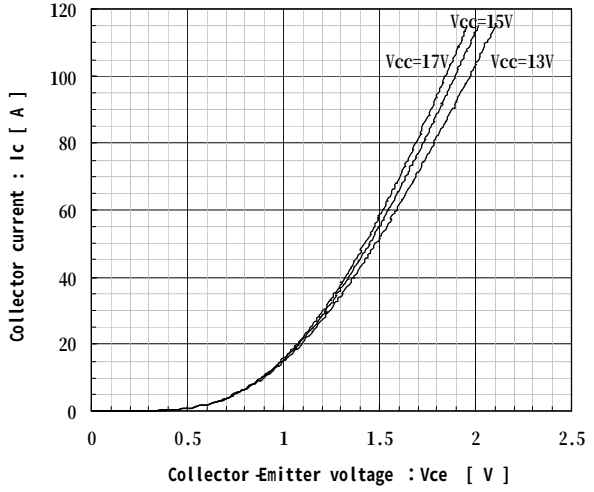
Characteristics(representative)

Main circuit

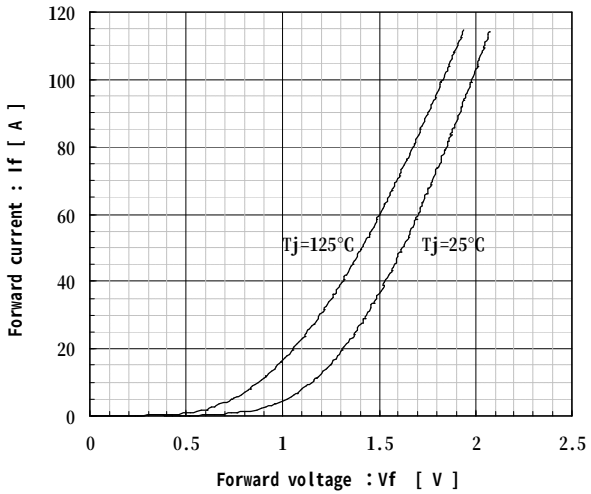
Collector current vs. Collector-Emitter voltage
Tj=25°C[Chip] (typ.)



Collector current vs. Collector-Emitter voltage
Tj=125°C[Chip] (typ.)



Forward current vs. Forward voltage
[Chip] (typ.)



Switching Loss vs. Collector Current (typ.)
Ed=300V,Vcc=15V,Tj=125°C