CIPOS™ Micro IM241

IM241-M6T2xx/IM241-M6S1x

Description

The CIPOS™ Micro IM241 product group offers the chance for integrating various power and control components to increase reliability, optimize PCB size and system costs. It is designed for high-efficiency appliance motor drives such as fans and pumps. This IPM is available in both fast and slow speeds for low loss and low EMI operation respectively. These advanced IPMs, available in both surface mount and through-hole configurations, offers a combination of reverse conducting IGBT technology and the industry benchmarked rugged half-bridge dirvers. The IPMs have several protection features including precise overcurrent protection and temperature feedback.

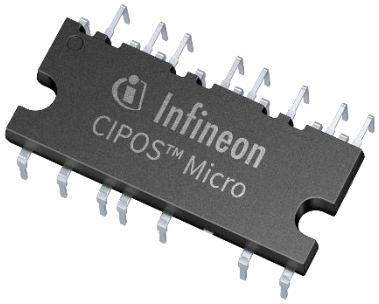
Features

Package

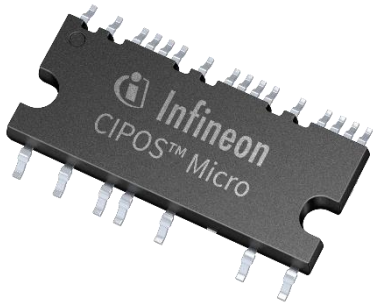
- Fully isolated DIP (Dual inline package) and SOP (Small outline package) module
- Lead-free terminal plating; RoHS compliant

Inverter

- 600 V Reverse conducting, RCD2 IGBT
- Integrated bootstrap functionality
- Fault reporting and programmable fault clear
- Overcurrent shutdown
- Advanced input filter with shoot-through protection
- Optimized dV/dt for loss and EMI trade offs
- Built-in NTC thermistor for temperature monitoring
- Low-side emitter pins accessible for phase current monitoring (open emitter)
- 3.3 V/ 5.0 V logic compatible
- Isolated 2000 V_{RMS}, 1 minute



DIP 29x12



SOP 29x12

Potential applications

Fan and pumps

Small home appliances

Product validation

Qualified for industrial applications according to the relevant tests of JEDEC47/20/22.

Table 1 Product information

Base part number	Package type	Standard pack		Remark
		Form	MOQ	
IM241-M6T2B	DIP 29x12	15 pcs / Tube	240 pcs	
IM241-M6T2B2	DIP 29x12	15 pcs / Tube	240 pcs	Long lead
IM241-M6T2J	DIP 29x12	15 pcs / Tube	240 pcs	
IM241-M6T2B2	DIP 29x12	15 pcs / Tube	240 pcs	Long lead
IM241-M6S1B	SOP 29x12	15 pcs / Tube Tape & Reel	240 pcs 500 pcs	
IM241-M6S1J	SOP 29x12	15 pcs / Tube Tape & Reel	240 pcs 500 pcs	

“B” = Fast speed version for low losses and “J” = Slow speed version for low EMI

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1 Internal electrical schematic

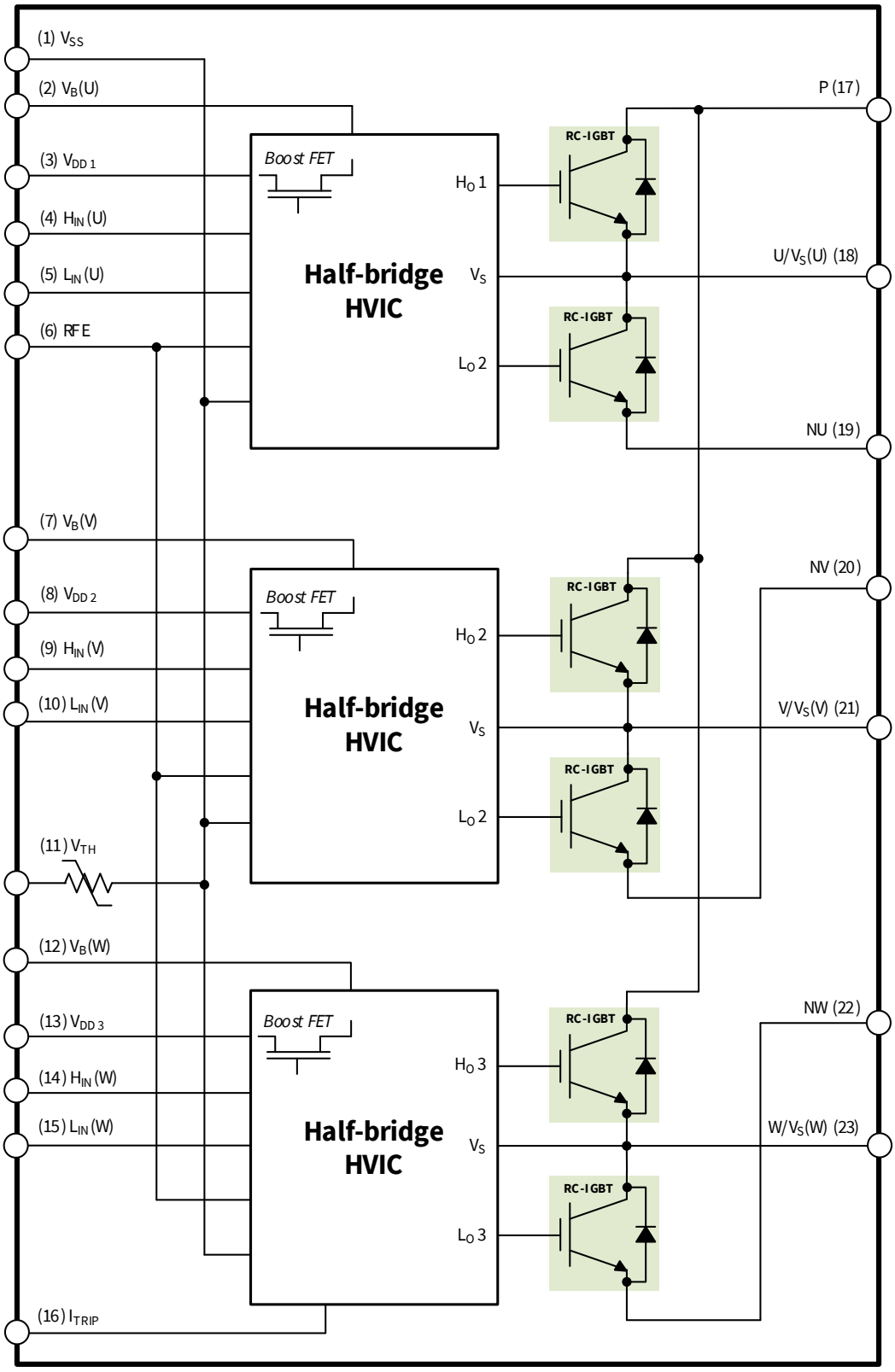


Figure 1 Internal electrical schematic

2 Pin description

2.1 Pin assignment

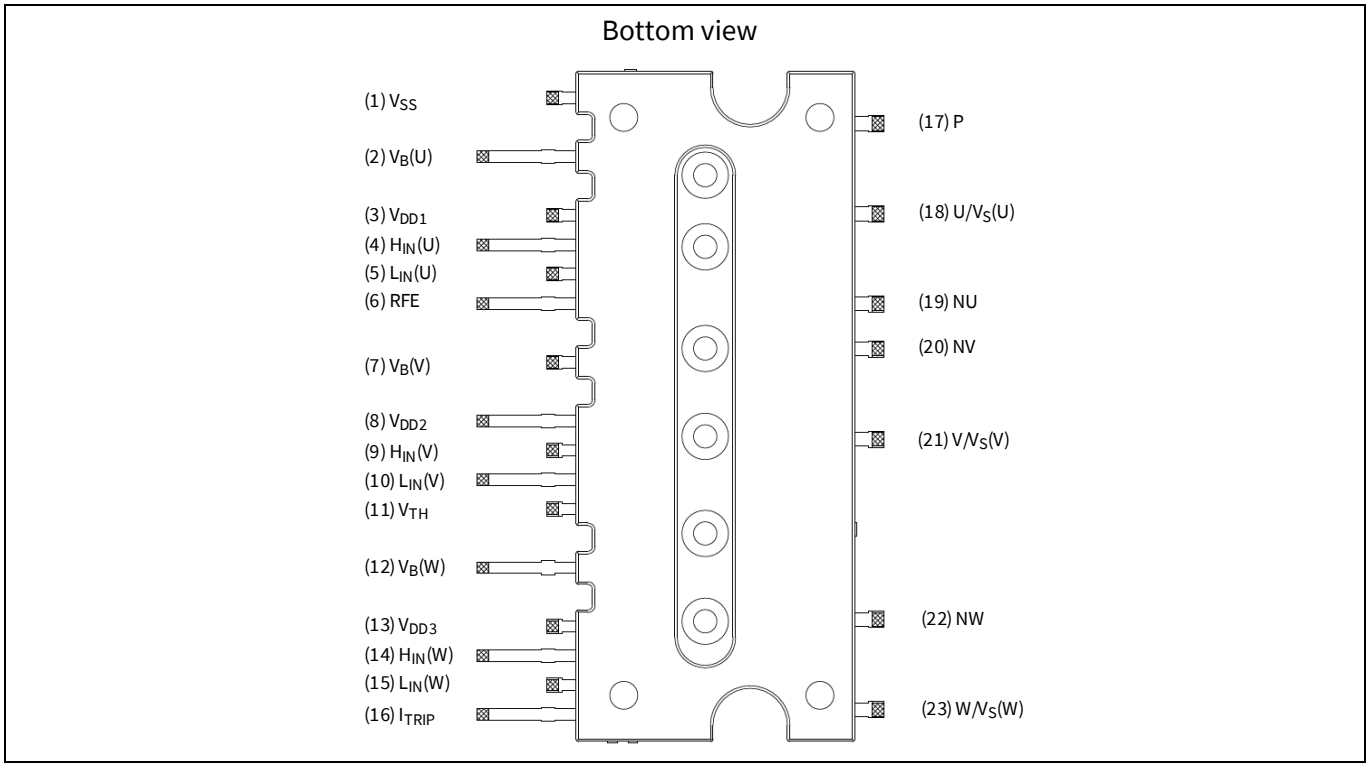


Figure 2 Pin configuration (IM241-M6T2x)

Table 2 Pin assignment

Pin number	Pin name	Pin description
1	V_{SS}	Logic ground
2	V_B(U)	U-phase high-side floating IC supply offset voltage
3	V_{DD1}	Low-side control supply 1
4	H_{IN}(U)	U-phase high-side gate driver input
5	L_{IN}(U)	U-phase low-side gate driver input
6	RFE	RCIN / Fault / Enable
7	V_B(V)	V-phase high-side floating IC supply offset voltage
8	V_{DD2}	Low-side control supply 2
9	H_{IN}(V)	V-phase high-side gate driver input
10	L_{IN}(V)	V-phase low-side gate driver input
11	V_{TH}	Themperature output
12	V_B(W)	W-phase high-side floating IC supply offset voltage
13	V_{DD3}	Low-side control supply 3
14	H_{IN}(W)	W-phase high-side gate driver input
15	L_{IN}(W)	W-phase low-side gate driver input
16	I_{TRIP}	Over-current shutdown input
17	P	Positive bus input voltage

Pin description

Pin number	Pin name	Pin description
18	U/V_S(U)	U-phase output, U-phase high-side floating IC supply offset voltage
19	NU	U-phase low-side emitter
20	NV	V-phase low-side emitter
21	V/V_S(V)	V-phase output, V-phase high-side floating IC supply offset voltage
22	NW	W-phase low-side emitter
23	W/V_S(W)	W-phase output, W-phase high-side floating IC supply offset voltage

2.2 Pin description

H_{IN} (U, V, W) and L_{IN} (U, V, W) (High-side pins, Pin 4, 9, 14 and Low-side pins, Pin 5, 10, 15)

These pins are positive logic and they are responsible for the control of the integrated IGBTs. The schmitt-trigger input thresholds of them are such to guarantee LSTTL and CMOS compatibility down to 3.3 V controller outputs. Pull-down resistor of about 800 kΩ is internally provided to pre-bias inputs during supply start-up and ESD diode is provided for pin protection purposes. Input schmitt-trigger and noise filter provide beneficial noise rejection to short input pulses.

The noise filter suppresses control pulses which are below the filter time $t_{FIL, IN}$ The filter acts according to Figure 4. It is not recommended for proper work to provide input pulse-width lower than 1 µs.

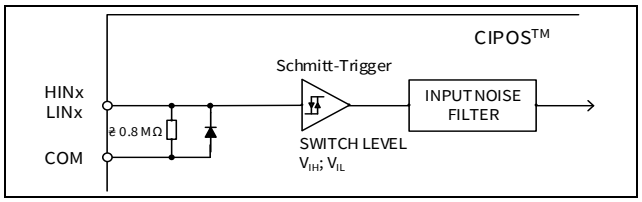


Figure 3 Input pin structure

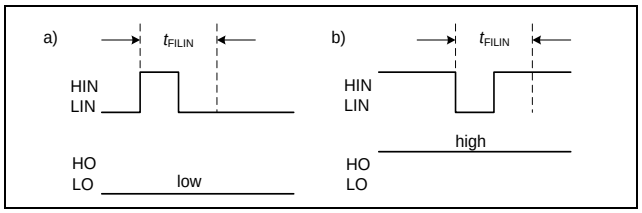


Figure 4 Input filter timing diagram

The integrated gate driver provides additionally a shoot through prevention capability which avoids the simultaneous on-state of the high-side and low-side switch for same leg.

A minimum deadtime insertion of typically 300 ns is also provided by driver IC, in order to reduce cross-conduction of the external power switches.

RFE (RCIN / Fault / Enable, Pin 6)

The RFE pin combines 3 functions in one pin: RCIN or RC-network based programmable fault clear timer, fault output and enable input.

The RFE pin is normally connected to an RC network on the PCB per the schematic in Figure 5. Under normal operating conditions, R_{RCIN} pulls the RFE pin to 3.3 V, thus enabling all the functions in the IPM. The microcontroller can pull this pin low to disable the IPM functionality. This is the enable function.

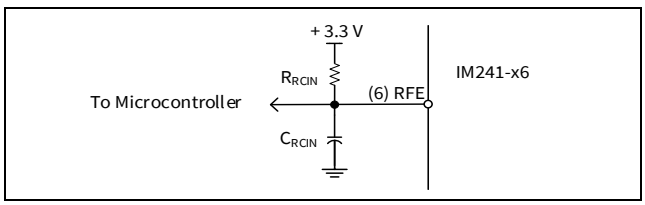


Figure 5 Typical PCB circuit connected to the RFE pin

The fault function allows the IPM to report a fault condition to the microncontroller by pulling the RFE pin low in one of two situations. The first is an under-voltage condition on V_{DD} and the second is when the I_{TRIP} pin sees a voltage rising above $V_{IT, TH+}$.

The programmable fault clear timer function provides a means of automatically re-enabling the module operation a preset amount of time ($T_{FLT-CLR}$) after the fault condition has disappeared. Figure 6 shows the RFE-related circuit block diagram inside the IPM.

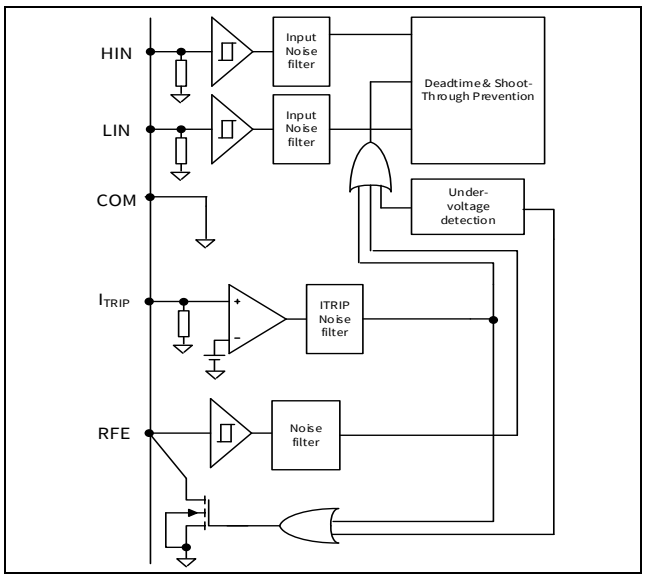


Figure 6 RFE-relaed circuit diagram

The length of TFLT-CLR can be determined by using the formula below.

$V_{RFE}(t) = 3.3\ V * (1 - e^{-t/RC})$

$T_{FLT-CLR} = -R_{RCIN} * C_{RCIN} * \ln(1-V_{RFE+} / 3.3\ V)$

For example, if R_{RCIN} is 1.2 MΩ and C_{RCIN} is 1 nF, the $T_{FLT-CLR}$ is about 1.7 ms with V_{RFE+} of 2.2 V. It is also important to note that C_{RCIN} needs to be minimized in order to make sure it is fully discharged in case of over current event.

Since the I_{TRIP} pin has a 500 ns input filter, it is appropriate to ensure that C_{RCIN} will be discharged below V_{RFE-} by the open-drain MOSFET, after 350 ns. Therefore, the max C_{RCIN} can be calculated as:

$V_{RFE}(t) = 3.3\ V * e^{-t/RC} < V_{RFE-}$

$C_{RCIN} < 350\ ns / (-\ln(V_{RFE-} / 3.3\ V) * R_{RFE\_ON})$

Consider V_{RFE-} of 0.8 V and R_{RFE_ON} of 50 Ω, C_{RCIN} should be less than 5 nF. It is also suggested to use a R_{RCIN} of between 0.5 MΩ and 2 MΩ.

V_{DDX}, V_{SX} (Low side control supply and reference, Pin 3, 8, 13 and reference, Pin 1)

V_{DD} is the control supply and it provides power both to input logic and to output power stage. Input logic is referenced to V_{SS} ground.

The undervoltage circuit enables the device to operate at power on when a supply voltage of at least a typical voltage of V_{DDUV+} = 11.1 V is present.

The IC shuts down all the gate drivers power outputs, when the V_{DD} supply voltage is below V_{DDUV-} = 10.9 V. This prevents the external power switches from critically low gate voltage levels during on-state and therefore from excessive power dissipation.

V_B (U, V, W) and V_S (U, V, W) (High-side supplies, Pin 2, 7, 12 and 18, 21, 23)

V_B to V_S is the high-side supply voltage. The high-side circuit can float with respect to V_{SS} following the external high-side power device emitter voltage.

Due to the low power consumption, the floating driver stage is supplied by integrated bootstrap circuit.

The undervoltage detection operates with a rising supply threshold of typical V_{BSUV+} = 11.1 V and a falling threshold of V_{BSUV-} = 10.9 V.

V_S (U, V, W) provide a high robustness against negative voltage in respect of V_{SS} of -50 V transiently. This ensures very stable designs even under rough conditions.

NW, NV, NU (Low-side emitter, Pin 19, 20, 22)

The low-side emitters are available for current measurements of each phase leg. It is recommended to keep the connection to pin V_{SS} as short as possible to avoid unnecessary inductive voltage drops.

V_{TH} (Thermistor output, Pin 11)

The V_{TH} pin provides direct accessto the NTC, which is referenced to V_{SS}. An external pull-up resistor connected to V_{DD} or +5 V ensures that the resulting voltage can be directly connected to the microcontroller.

W/V_S(W), V/V_S(U), U/V_S(W) (High-side emitter and low-side collector, Pin 18, 21, 23)

These pins are connected to motor U, V, W input pins.

P (Positive bus input voltage, Pin 17)

The high-side IGBTs are connected to the bus voltage. It is noted that the bus voltage does not exceed 450 V.

3 Absolute maximum ratings

(V_{DD} = 15 V and T_J = 25°C, if not stated otherwise)

3.1 Module section

Description	Symbol	Condition	Value	Unit
Storage temperature range	T_{STG}		-40 ~ 125	°C
Operating case temperature	T_C	Refer to Figure 8	-40 ~ 125	°C
Operating junction temperature	T_J		-40 ~ 150	°C
Isolation voltage	V_{ISO}	1 min, RMS, f = 60 Hz	2000	V

3.2 Inverter section

Description	Symbol	Condition	Value	Unit
Maximum blocking voltage	V_{CES}	I_C = 250 µA	600	V
DC link supply voltage of P - N	V_{PN}	Applied between P - N	450	V
DC link supply voltage (surge) of P - N	$V_{PN(Surge)}$	Applied between P - N	500	V
Collector current[1]	I_C	T_C = 25°C, T_J < 150°C	±4	A
Maximum peak collector current	I_{CP}	T_C = 25°C, T_J < 150°C, less than 1 ms	±6	A
Power dissipation per IGBT	P_{tot}		10	W
Short circuit withstand time	t_{SC}	V_{DD} = 15 V, V_{DC} ≤ 400 V, T_J ≤ 150°C	3	µs

3.3 Control section

Description	Symbol	Condition	Value	Unit
Module control supply voltage	V_{DD}	Applied between V_{DD} - V_{SS}	-0.3 ~ 20	V
High-side floating supply voltage (V_B reference to V_S)	V_{BS}	Applied between V_B - V_S	-0.3 ~ 20	V
Input voltage (L_{IN}, H_{IN}, I_{TRIP}, RFE)	V_{IN}		-0.3 ~ 20	V

[1]Limited by junction temperature.

4 Thermal characteristics

Description	Symbol	Condition	Value			Unit
			Min.	Typ.	Max.	
Single IGBT thermal resistance, junction-case	R_{thJC}	Low-side V-phase (See Figure 8 for T_C measurement point)	-	-	11.8	K/W
Single diode thermal resistance, junction-case	$R_{thJC, D}$		-	-	12.6	K/W

5 Recommended operation conditions

All voltages are absolute voltages referenced to V_{SS}-potential unless otherwise specified.

Description	Symbol	Value			Unit
		Min.	Typ.	Max.	
DC link supply voltage of P - N	V_{PN}	0	300	400	V
Low-side supply voltage	V_{DD}	13.5	15.0	16.5	V
High-side floating supply voltage (V_B vs. V_S)	V_{BS}	12.5	15.0	17.5	V
Logic input voltages L_{IN}, H_{IN}, I_{TRIP}, RFE	V_{IN}	0	-	5	V
Inverter PWM carrier frequency	f_{PWM}	-	20	-	kHz
External dead time between H_{IN} & L_{IN}	DT	1	-	-	µs
Voltage between V_{SS} - N (including surge)	V_{COMP}	-5	-	5	V
Minimum input pulse width	$PW_{IN(ON)}$, $PW_{IN(OFF)}$	1	-	-	µs

6 Static parameters

(V_{DD} = 15 V and T_J = 25°C, if not stated otherwise)

6.1 Inverter section

Description	Symbol	Condition	Value			Unit
			Min.	Typ.	Max.	
Collector-emitter saturation voltage	$V_{CE(Sat)}$	I_C = 0.5 A, T_J = 25°C	-	1.13	-	V
		I_C = 1.0 A, T_J = 25°C	-	1.37	1.58	
		I_C = 1.0 A, T_J = 150°C	-	1.36	-	
Collector-emitter leakage current	I_{CES}	V_{CE} = 600 V	-	-	1	mA
Diode forward voltage	V_F	I_C = 0.5 A, T_J = 25°C	-	1.18	-	V
		I_C = 1.0 A, T_J = 25°C	-	1.38	1.60	
		I_C = 1.0 A, T_J = 150°C	-	1.34	-	

6.2 Control section

Description	Symbol	Condition	Value			Unit
			Min.	Typ.	Max.	
Logic "1" input voltage (L_{IN}, H_{IN})	V_{IH}		2.2	-	-	V
Logic "0" input voltage (L_{IN}, H_{IN})	V_{IL}		-	-	0.8	V
I_{TRIP} positive going threshold	$V_{IT, TH+}$		475	500	525	mV
I_{TRIP} negative going threshold	$V_{IT, TH-}$		-	430	-	mV
I_{TRIP} input hysteresis	$V_{IT, HYS}$		-	70	-	mV
V_{DD} and V_{BS} supply undervoltage positive going threshold	V_{DDUV+}, V_{BSUV+}		10.6	11.1	11.6	V
V_{DD} and V_{BS} supply undervoltage negative going threshold	V_{DDUV-}, V_{BSUV-}		10.4	10.9	11.4	V
V_{DD} and V_{BS} supply undervoltage lockout hysteresis	V_{DDUVH}, V_{BSUVH}		-	0.2	-	V
Quiescent V_{BSx} supply current (V_{BSx} only)	I_{QBS}	V_{HIN} = 0 V	-	-	100	µA
Quiescent V_{DD} supply current (V_{DD} only)	I_{QDD}	V_{LIN} = 0 V, V_{HINX} = 5 V	-	-	3	mA
Input bias current for L_{IN}, H_{IN}	I_{IN+}	V_{IN} = 5 V	-	6.25	12.5	µA
Input bias current for RFE	$I_{IN, RFE+}$	$V_{IN, RFE}$ = 5 V	-	-	1	µA
Input bias current for I_{TRIP}	I_{ITRIP+}	V_{ITRIP} = 5 V	-	5	20	µA
Bootstrap resistance	R_{BS}		-	200	-	Ω
RFE low on resistance	R_{RFE}		-	34	60	Ω

7 Dynamic parameters

(V_{DD} = 15 V and T_J = 25°C, if not stated otherwise)

7.1 Inverter section – Fast speed version (“B” version)

Description	Symbol	Condition	Value			Unit
			Min.	Typ.	Max.	
Turn-on propagation delay time	t_{on}	$V_{LIN, HIN}$ = 5 V, I_C = 1.0 A, V_{DC} = 300 V	-	508	-	ns
Turn-on rise time	t_r		-	7.44	-	ns
Turn-on switching time	$t_{c(on)}$		-	52.6	-	ns
Reverse recovery time	t_{rr}		-	84.2	-	ns
Turn-on slew rate	dV/dt		-	6.91	-	V/ns
Turn-off propagation delay time	t_{off}	$V_{LIN, HIN}$ = 0 V, I_C = 1.0 A, V_{DC} = 300 V	-	737	-	ns
Turn-off fall time	t_f		-	116	-	ns
Turn-off switching time	$t_{c(off)}$		-	101	-	ns
IGBT turn-on energy (includes reverse recovery of diode)	E_{on}	V_{DC} = 300 V, I_C = 1.0 A T_J = 25°C 150°C	- -	19.9 42.4	- -	µJ
IGBT turn-off energy	E_{off}	V_{DC} = 300 V, I_C = 1.0 A T_J = 25°C 150°C	- -	13.6 21.2	- -	µJ
Diode recovery energy	E_{rec}	V_{DC} = 300 V, I_C = 1.0 A T_J = 25°C 150°C	- -	16.0 29.8	- -	µJ

7.2 Control section – Fast speed version (“B” version)

Description	Symbol	Condition	Value			Unit
			Min.	Typ.	Max.	
Input filter time (H_{IN}, L_{IN})	$t_{FIL, IN}$	$V_{LIN, HIN}$ = 0 V or 5 V	-	300	-	ns
Input filter time I_{TRIP}	$t_{FIL, ITRIP}$	V_{IN} = 0 or 5 V	-	500	-	ns
RFE low to six switch turn-off propagate delay	t_{EN}	V_{IN} = 0 or 5 V, V_{RFE} = 5 V		420		ns
I_{TRIP} low to six switch turn-off propagate delay	t_{ITRIP}	V_{DC} = 300 V, No cap. on RFE		1.3		µs
Internal deadtime	DT_{IC}	V_{IN} = 0 or 5 V	-	300	-	ns
Matching propagation delay time (On & Off) all channels	M_T	External dead time > 500 ns	-	-	50	ns

7.3 Inverter section – Low speed version (“J” version)

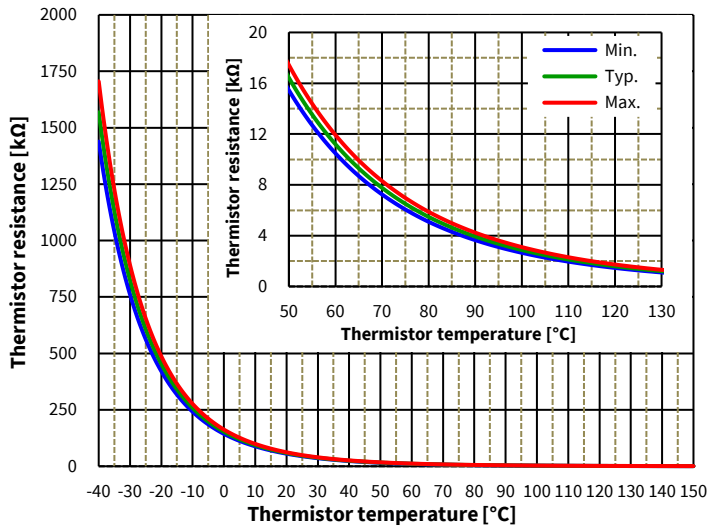
Description	Symbol	Condition	Value			Unit
			Min.	Typ.	Max.	
Turn-on propagation delay time	t_{on}	$V_{LIN, HIN}$ = 5 V, I_C = 1.0 A, V_{DC} = 300 V	-	588	-	ns
Turn-on rise time	t_r		-	16.4	-	ns
Turn-on switching time	$t_{c(on)}$		-	188	-	ns
Reverse recovery time	t_{rr}		-	184	-	ns
Turn-on slew rate	dV/dt		-	1.60	-	V/ns
Turn-off propagation delay time	t_{off}	$V_{LIN, HIN}$ = 0 V, I_C = 1.0 A, V_{DC} = 300 V	-	1220	-	ns
Turn-off fall time	t_f		-	163	-	ns
Turn-off switching time	$t_{c(off)}$		-	157	-	ns
IGBT turn-on energy (includes reverse recovery of diode)	E_{on}	V_{DC} = 300 V, I_C = 1.0 A T_J = 25°C 150°C	- -	59.6 94.1	- -	µJ
IGBT turn-off energy	E_{off}	V_{DC} = 300 V, I_C = 1.0 A T_J = 25°C 150°C	- -	21.3 24.1	- -	µJ
Diode recovery energy	E_{rec}	V_{DC} = 300 V, I_C = 1.0 A T_J = 25°C 150°C	- -	21.2 24.4	- -	µJ

7.4 Control section – Low speed version (“J” version)

Description	Symbol	Condition	Value			Unit
			Min.	Typ.	Max.	
Input filter time (H_{IN}, L_{IN})	$t_{FIL, IN}$	$V_{LIN, HIN}$ = 0 V or 5 V	-	300	-	ns
Input filter time I_{TRIP}	$t_{FIL, ITRIP}$	V_{IN} = 0 or 5 V	-	500	-	ns
RFE low to six switch turn-off propagate delay	t_{EN}	V_{IN} = 0 or 5 V, V_{RFE} = 5 V		490		ns
I_{TRIP} low to six switch turn-off propagate delay	t_{ITRIP}	V_{DC} = 300 V, No cap. on RFE		1.3		µs
Internal deadtime	DT_{IC}	V_{IN} = 0 or 5 V	-	300	-	ns
Matching propagation delay time (On & Off) all channels	M_T	External dead time > 500 ns	-	-	50	ns

8 Thermistor characteristics

Description	Symbol	Condition	Value			Unit
			Min.	Typ.	Max.	
Resistance	R_{NTC}	T_{NTC} = 25°C T_{NTC} = 125°C	- -	47 1.38	- -	kΩ
B-constant of NTC (Negative Temperature Coefficient) thermistor	B (25/50)		-	4050	-	K
Temperature range			- 20	-	150	°C



Temp. [°C]	$R_{Min.}$ [kΩ]	$R_{Typ.}$ [kΩ]	$R_{Max.}$ [kΩ]
50	15.448	16.432	17.436
60	10.483	11.194	11.924
70	7.245	7.765	8.302
80	5.091	5.477	5.876
90	3.648	3.937	4.237
100	2.653	2.872	3.101
110	1.957	2.125	2.301
120	1.462	1.592	1.729
125	1.269	1.384	1.505

Figure 7 Thermistor resistance – temperature curve and table

9 Mechanical characteristics and ratings

Description	Condition	Value			Unit
		Min.	Typ.	Max.	
Mounting torque	M3 screw and washer with thermal grease	0.4	0.6	0.8	N·m
Backside curvature	Refer to Figure 9	-50	-	50	µm
Weight		-	3	-	g

10 Qualification information

UL certification	File number: UL-US-L252584-15-22508102-2	
Moisture sensitivity level	MSL3 (SOP 29x12 only)	
RoHS compliant	Yes (Lead-free terminal plating)	
ESD (Electrostatic Discharge)	HBM (Human body model)	2000 V
	CDM (Charged device model)	500 V

11 Diagrams and tables

11.1 T_C measurement point

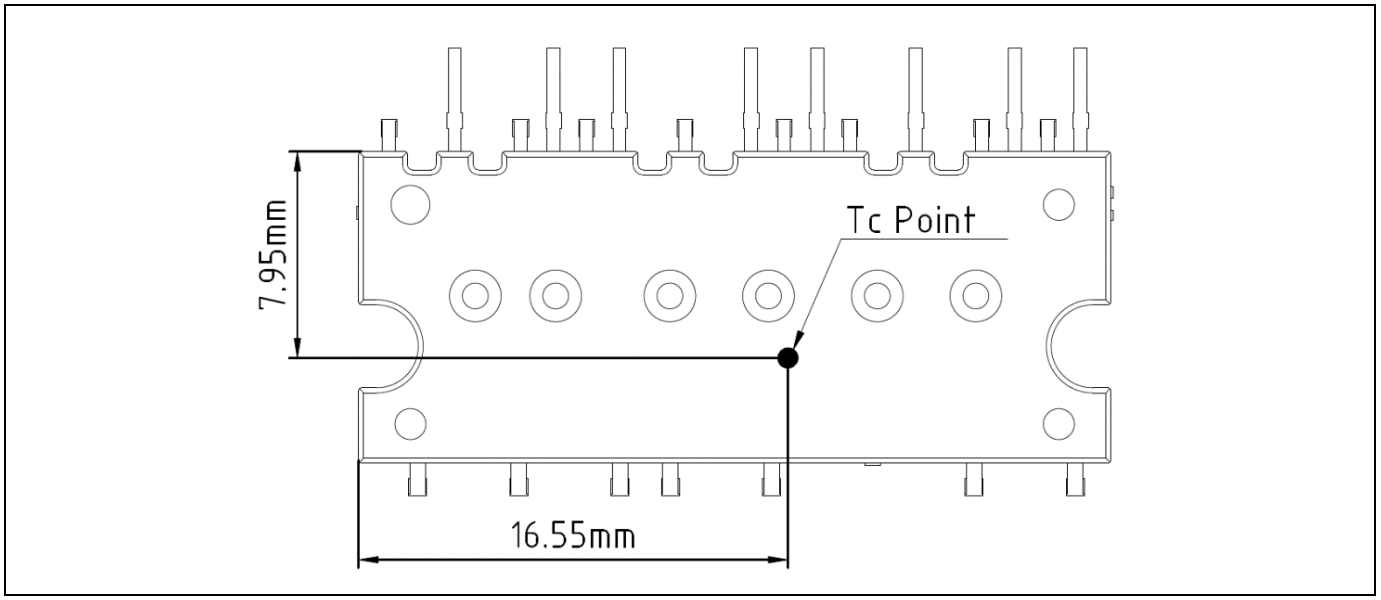


Figure 8 T_C measurement point[1]

11.2 Backside curvature measurement point

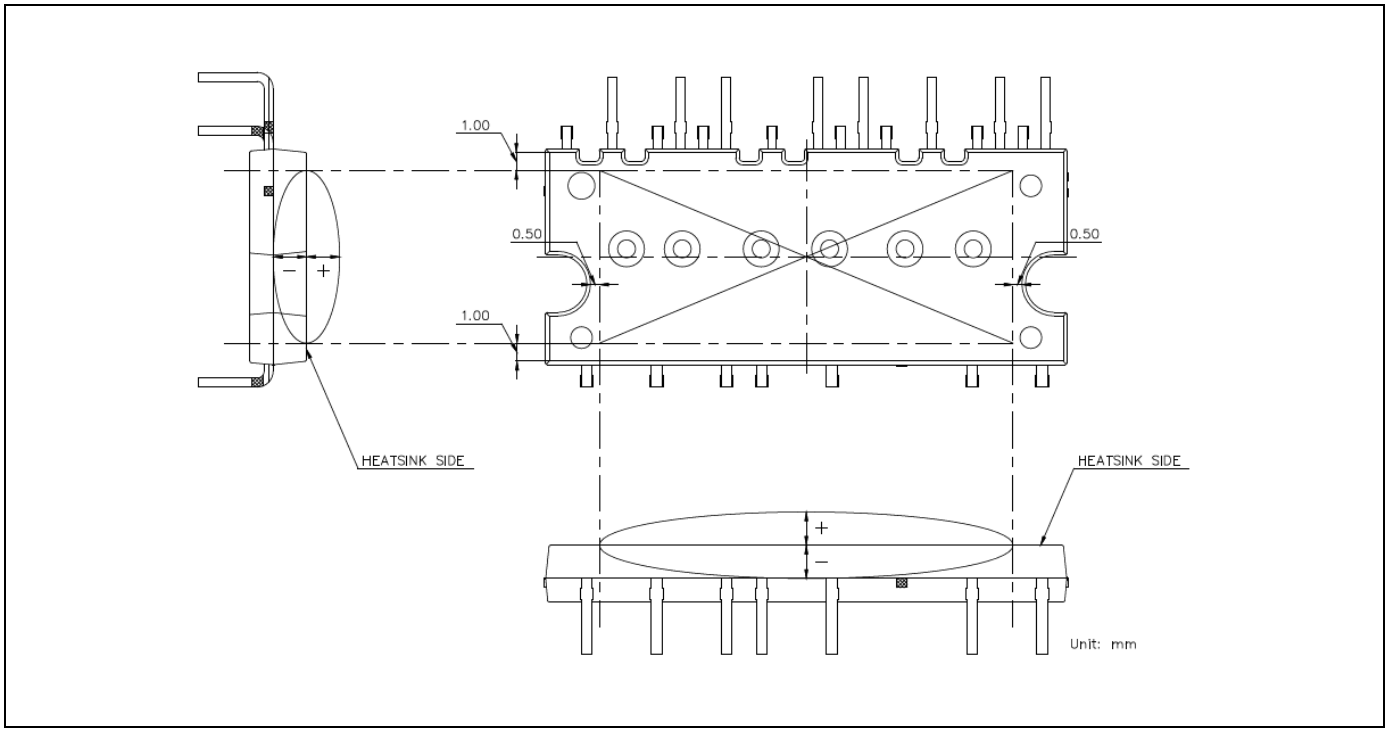


Figure 9 Backside curvature measurement position

[1]Any measurement except for the specified point in Figure 8 is not relevant for the temperature verification and brings wrong or different information.

11.3 Switching time definition

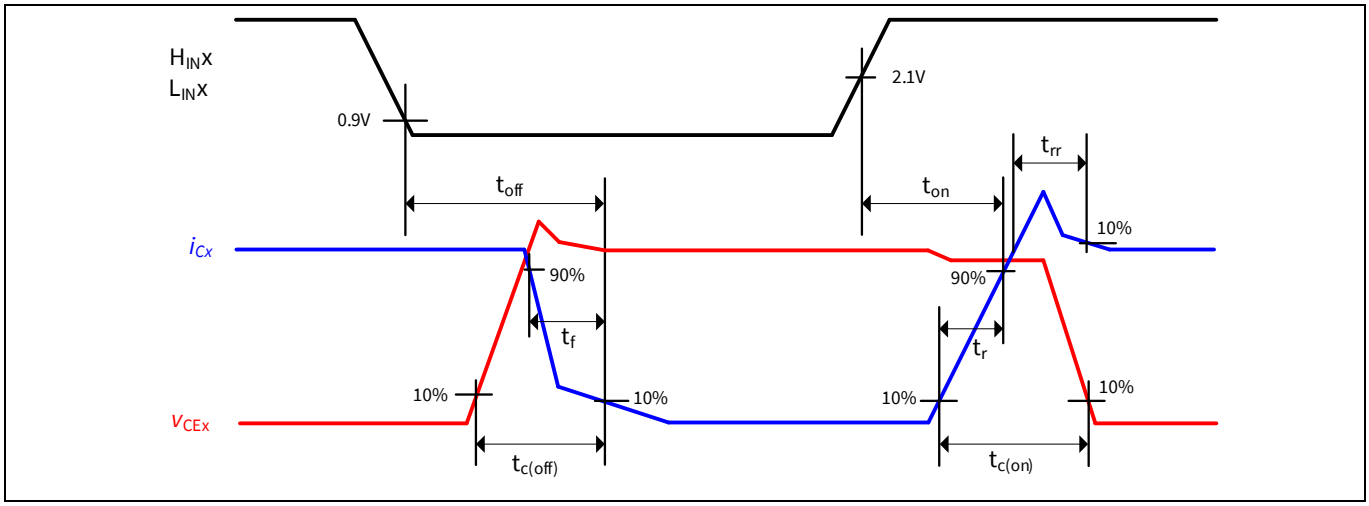
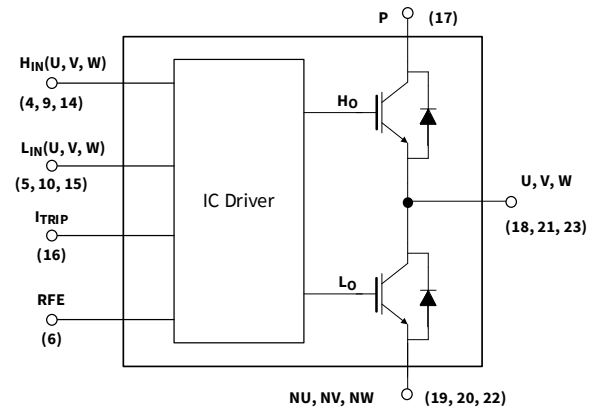


Figure 10 Switching times definition

11.4 Input-ouput logic table



RFE	I_{TRIP}	H_{IN}(U, V, W)	L_{IN}(U, V, W)	U, V, W
1	0	1	0	V+
1	0	0	1	0
1	0	0	0	‡
1	0	1	1	‡
1	1	x	x	‡
0	x	x	x	‡

‡ Voltage depends on direction of phase current

Figure 11 Input-output logic table

11.5 I_{TRIP} timing diagram

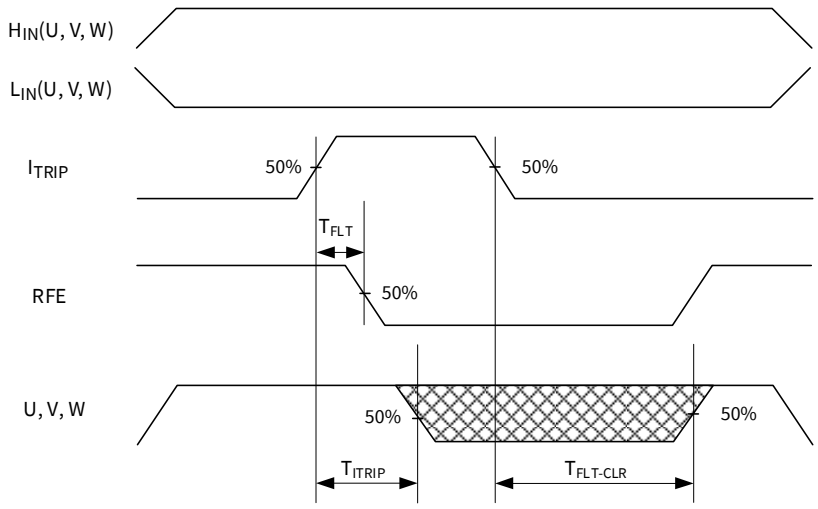


Figure 12 I_{TRIP} timing diagram

11.6 Ouput disable timing diagram

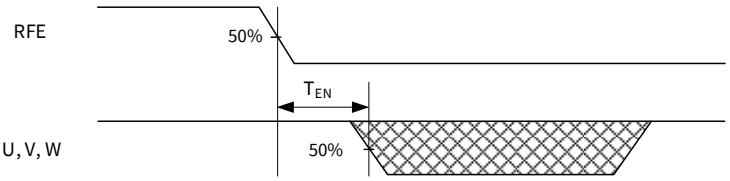


Figure 13 Output disable timing diagram

11.7 $-V_S$ immunity

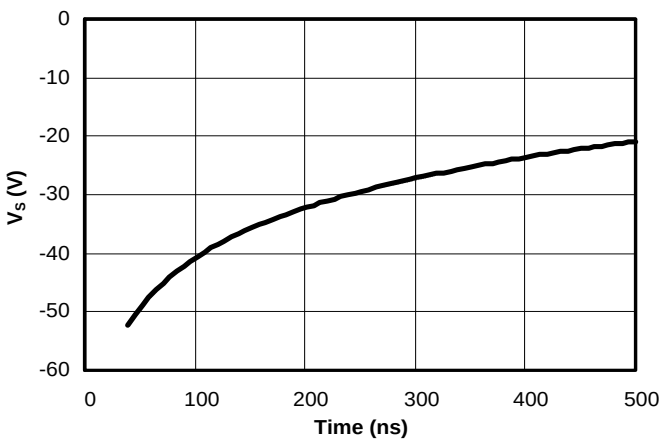


Figure 14 Negative transient V_s SOA for integrated gate driver

12 Application guide

12.1 Typical application schematic

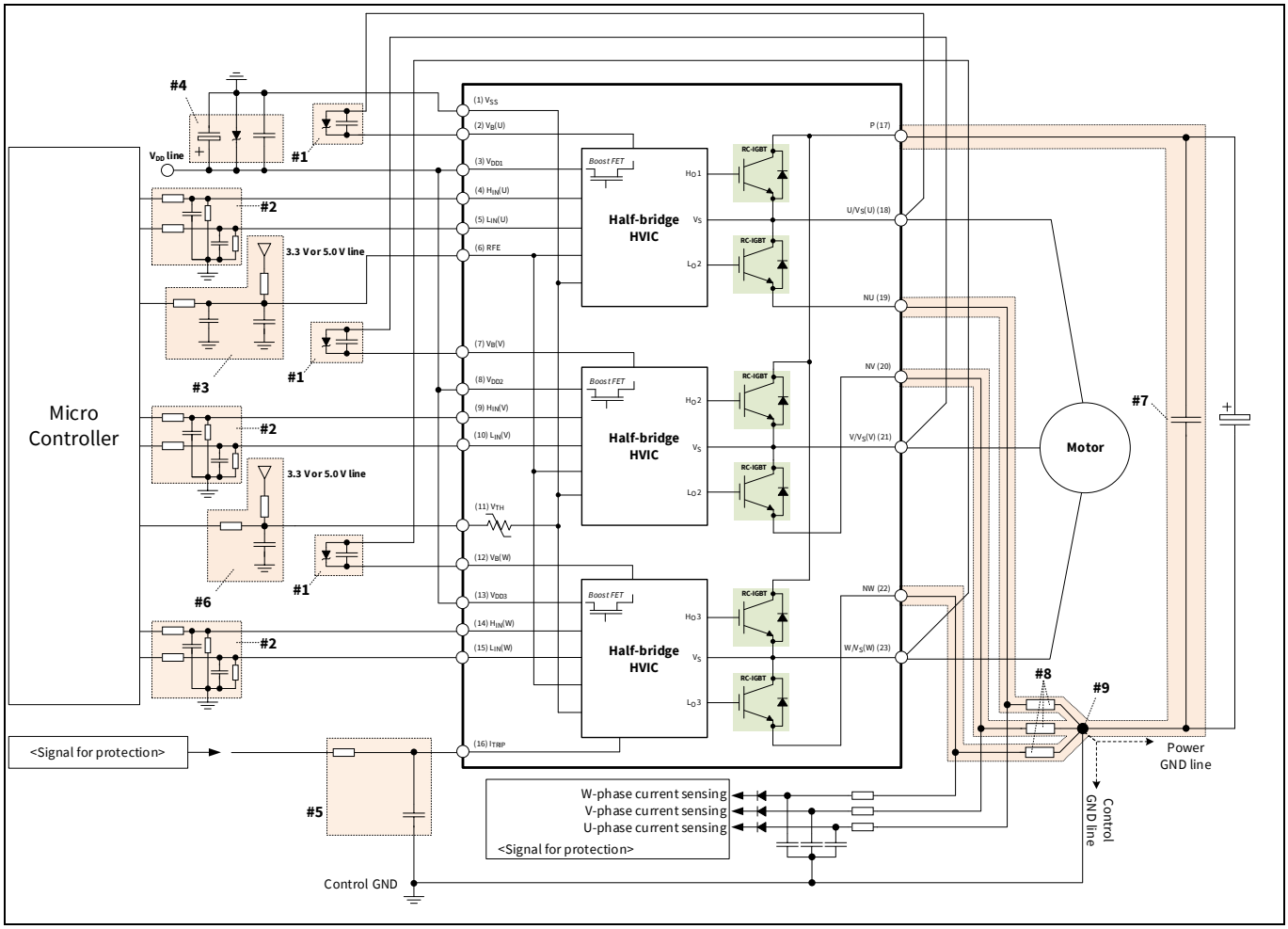


Figure 15 Typical application circuit

1. V_B-V_S circuit
   - Capacitor and Zener diode for high-side floating supply voltage should be placed as close to V_B and V_S pins as possible.
   - High-frequency capacitors are strongly recommended about 1 µF size.
2. Input circuit
   - To reduce input signal noise by high-speed switching, the R_{IN} and C_{IN} filter circuit should be mounted. (100 Ω, 1 nF and need pull down resistor around 4.7 to 10 kΩ)
   - C_{IN} should be placed as close to V_{SS} pin as possible.
3. RFE circuit
   - RFE pin is open drain configuration. This terminal should be pulled up to the bias voltage of the 3.3 V/5.0 V through a proper resistor.
   - It is recommended that RC filter is placed close to the controller.
4. V_{DD}-V_{SS} circuit
   - Capacitor and Zener diode for control supply voltage should be placed as close to V_{DDx} and V_{SS} pins as possible.
5. I_{TRIP} circuit
   - To prevent protection-function errors, C_{ITRIP} should be placed as close to the I_{TRIP} and V_{SS} pins as possible.
   - To prevent fault operation of the protection function, an RC filter is recommended around 1.5~2.0 µs (68 Ω, 22 nF, “Signal for protection” in the schematic leads the signal into the microcontroller”).

6. V_{TH} circuit
   - It is recommended that the RC filter be placed close to the controller.
   - To define suitable voltage for temperature monitoring, this terminal should be pulled up to the bias voltage of 3.3 V/5.0 V by a proper resistor.
7. Snubber capacitor
   - The wiring between IPM and snubber capacitor including shunt resistor should be as short as possible.
8. Shunt resistor
   - The shunt resistor of SMD type should be used for reducing its stray inductance.
9. Ground pattern
   - Ground pattern (Control and power ground) should be separated at only one point of shunt resistor as short as possible.
   - Pattern overlap of power ground ans signal groduld should be minized.
   - The patterns should be connected at one common end point of shunt resistors.

13 Package outline

Package dimension

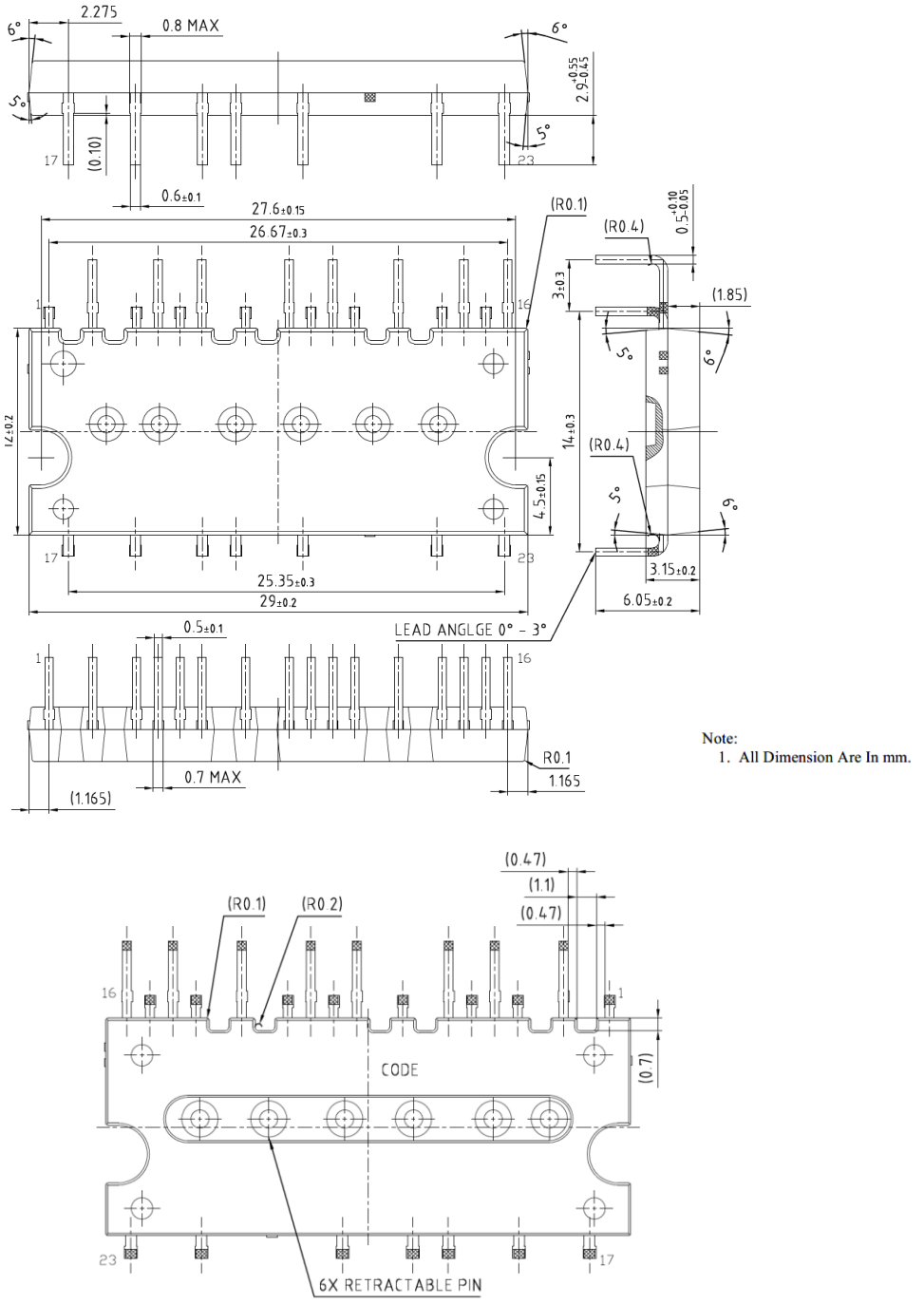


Figure 16 IM241-M6T2x (DIP 29x12)

Package dimension – Long lead

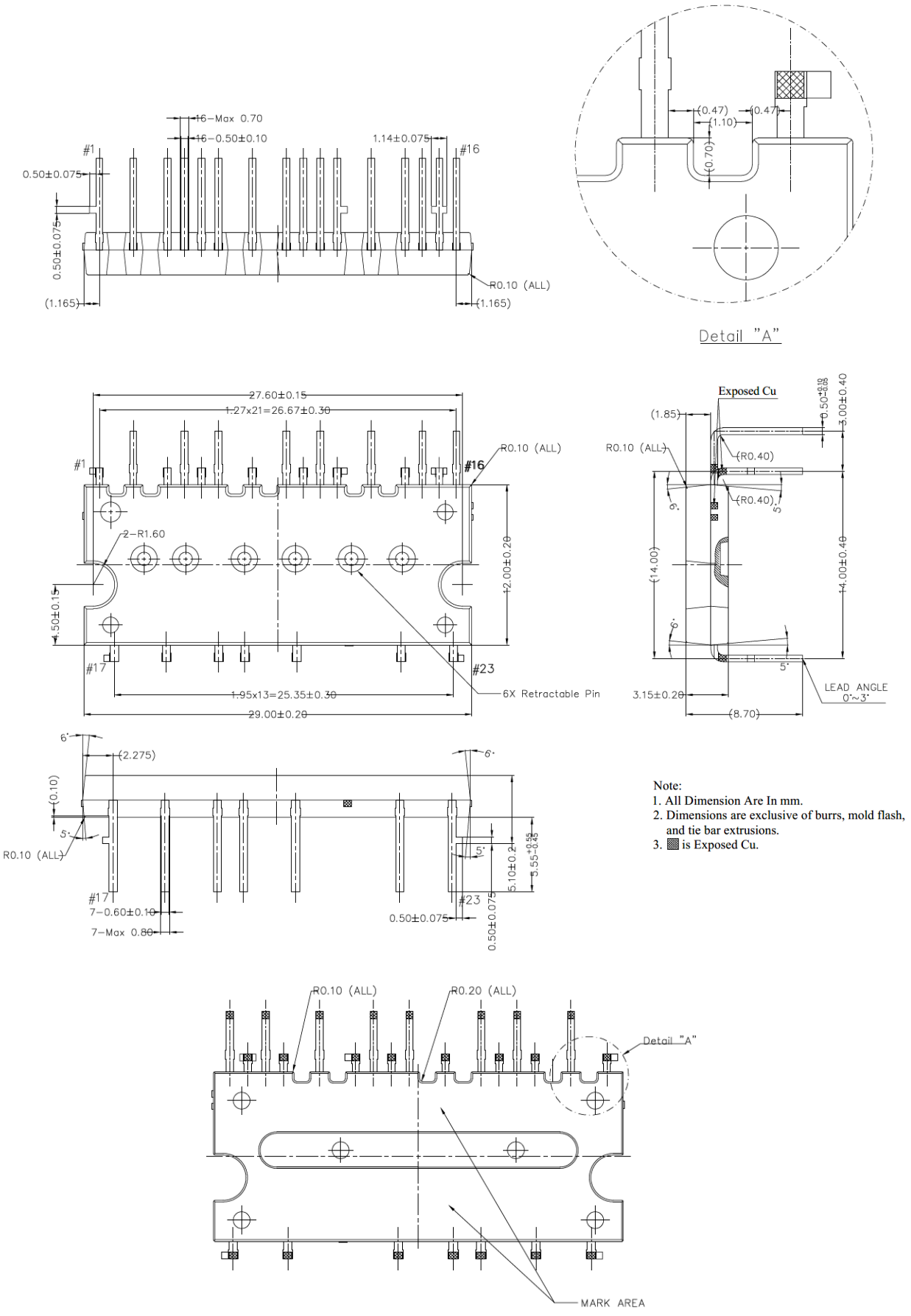
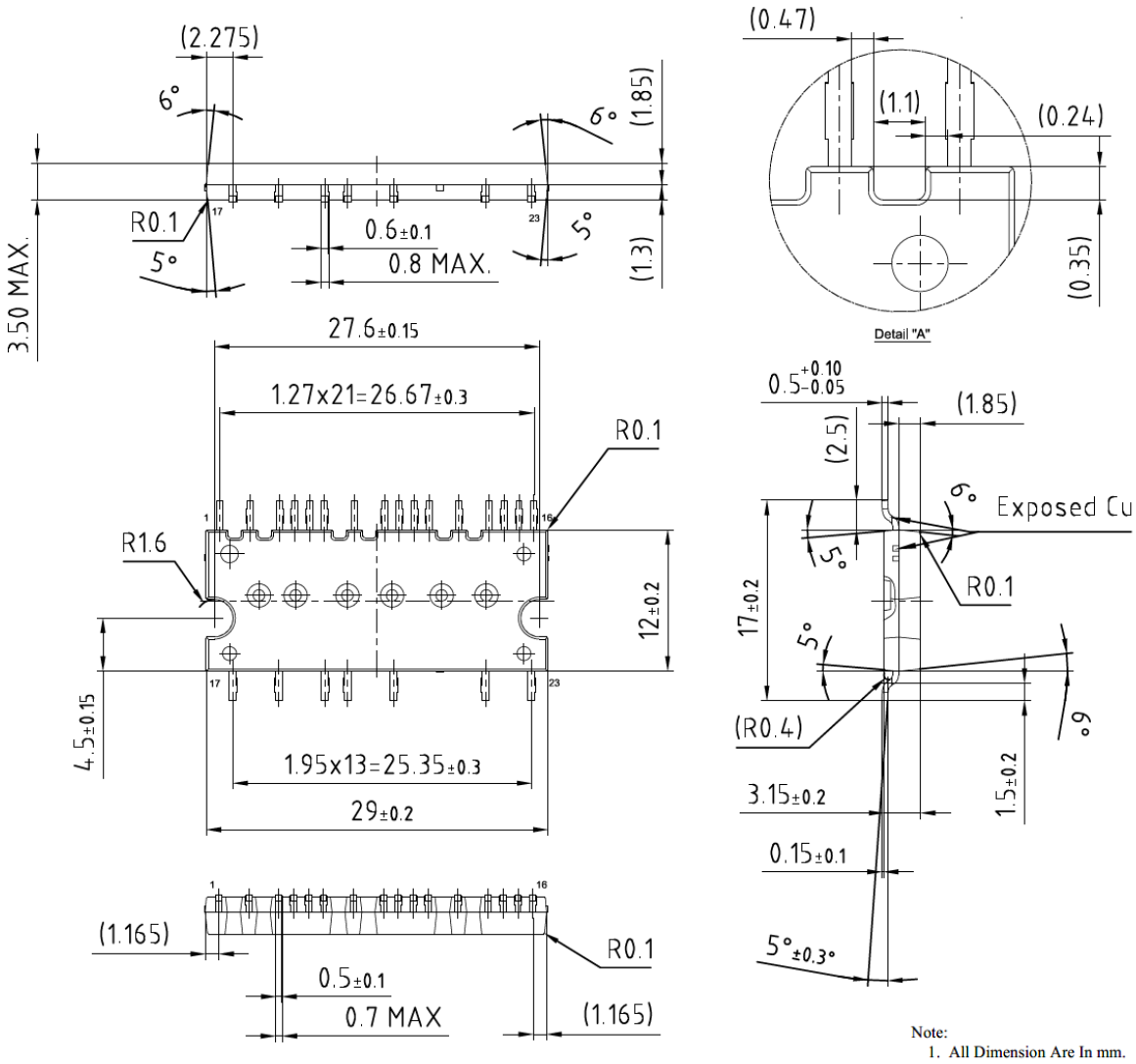


Figure 17 IM241-M6T2x2 (DIP 29x12)

Package outline

Package dimension



Note:
1. All Dimension Are In mm.

Recommended PCB design

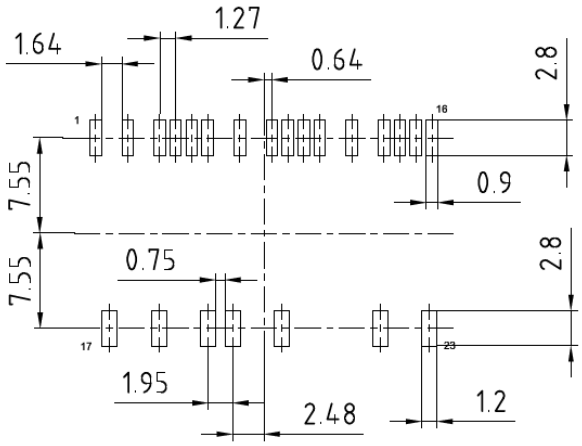


Figure 18 IM241-M6S1x (SOP 29x12)

Revision history

Document version	Date of release	Description of changes
V 1.00	2023-01-10	Initial release
V 1.10	2023-02-20	Update related items according to the long lead type products and HBM ESD level
V2.00	2024-06-04	Revise datasheet format

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