

PRELIMINARY

Mountable Unit on Module

VLA586-01R

GATE DRIVER FOR Full-SiC MODULE

VLA586-01R



*Image Photo mounted on Full-SiC module

FEATURES

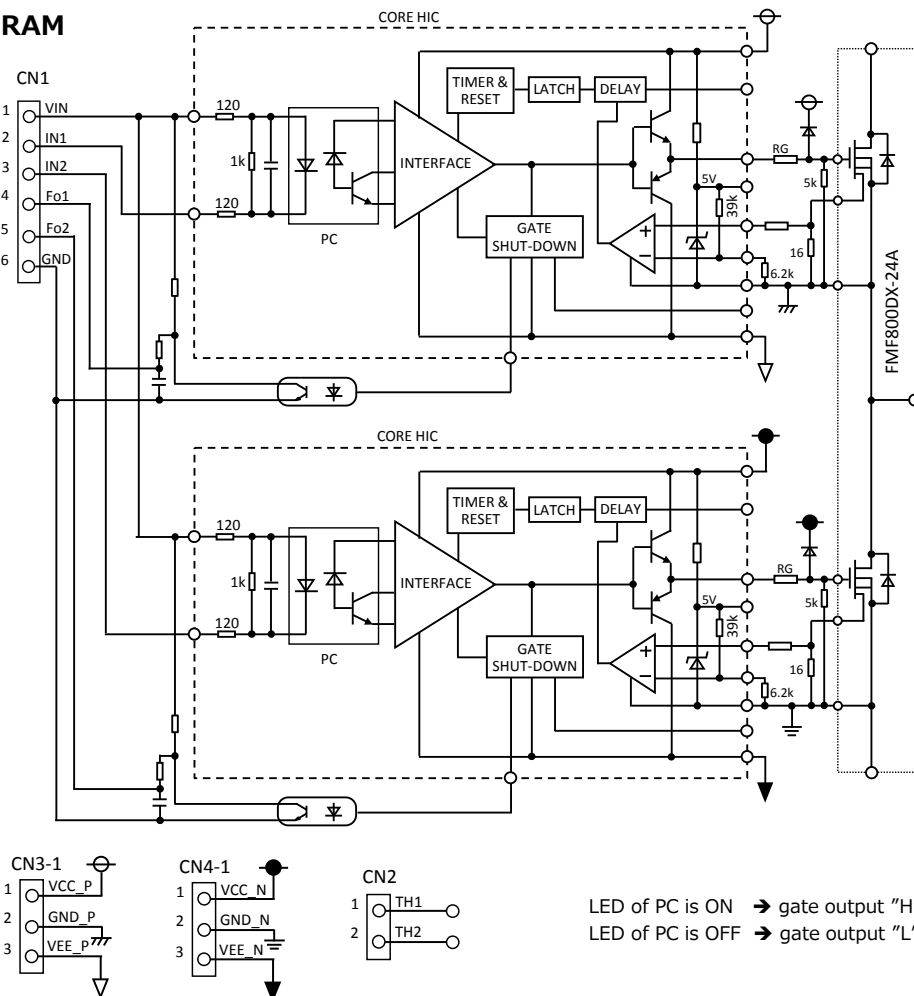
- Directly mountable on the Full-SiC module
- Dual gate drive circuits
- Short circuit detection for sense signal of Full-SiC module
- Built in short circuit protection with soft gate shut down
- Output peak gate current is +/-7A(max)
- Isolation voltage is 2500Vrms (for 1 minute)
- CMOS compatible input interface

TARGETED IGBT MODULES
FMF800DX-24A (MITSUBISHI)

APPLICATIONS

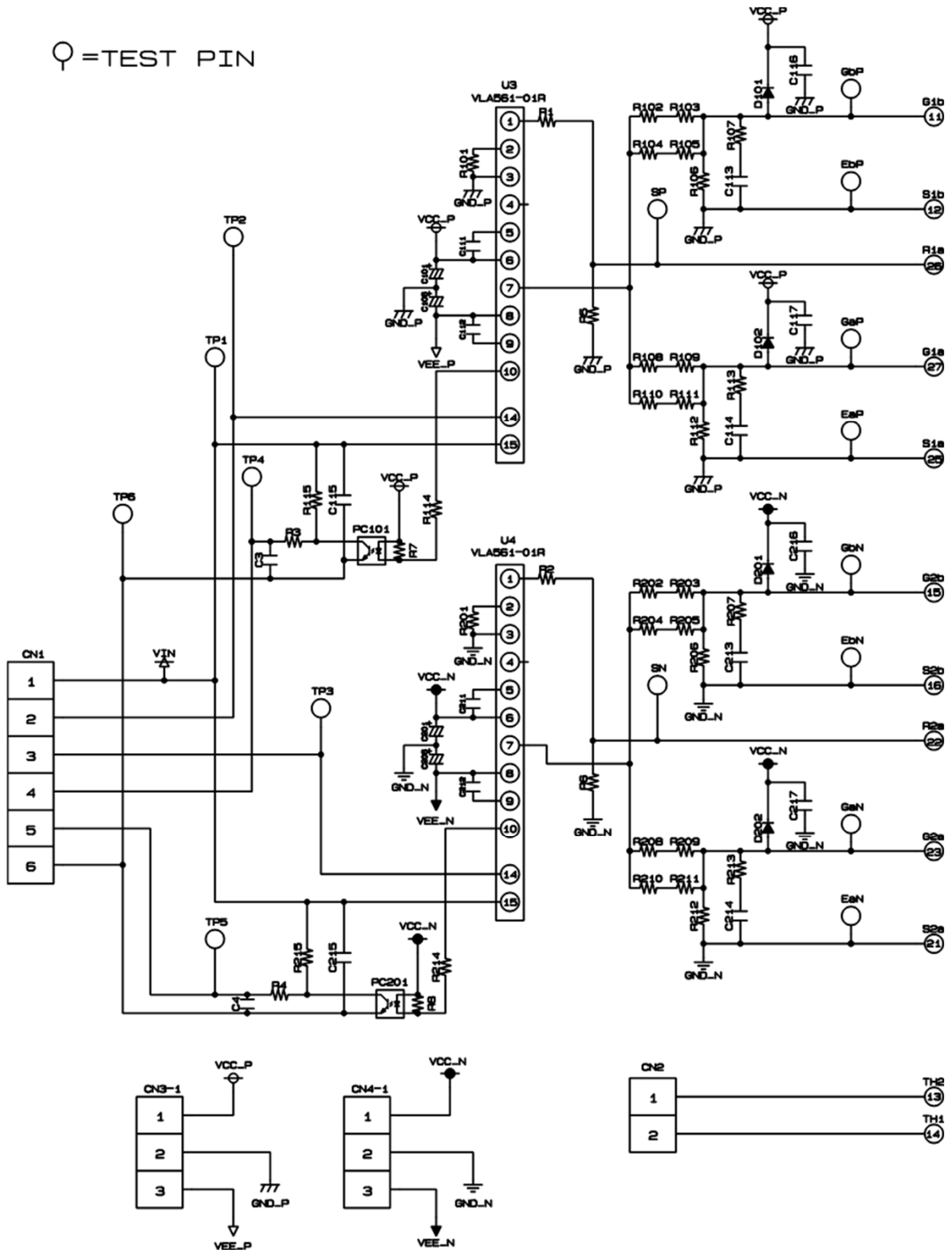
To drive Full-SiC module for inverter, servo amplifier or power unit

BLOCK DIAGRAM



CIRCUIT DIAGRAM

○ = TEST PIN



Note.1) Gate resistors are not installed at the time of shipment . Please solder the chosen gate resistors.
 Note.2) C111~114, C211~214, R102~105, R107~111, R113, R202~205, R207~211, R213 are non-mounted.

PRELIMINARY

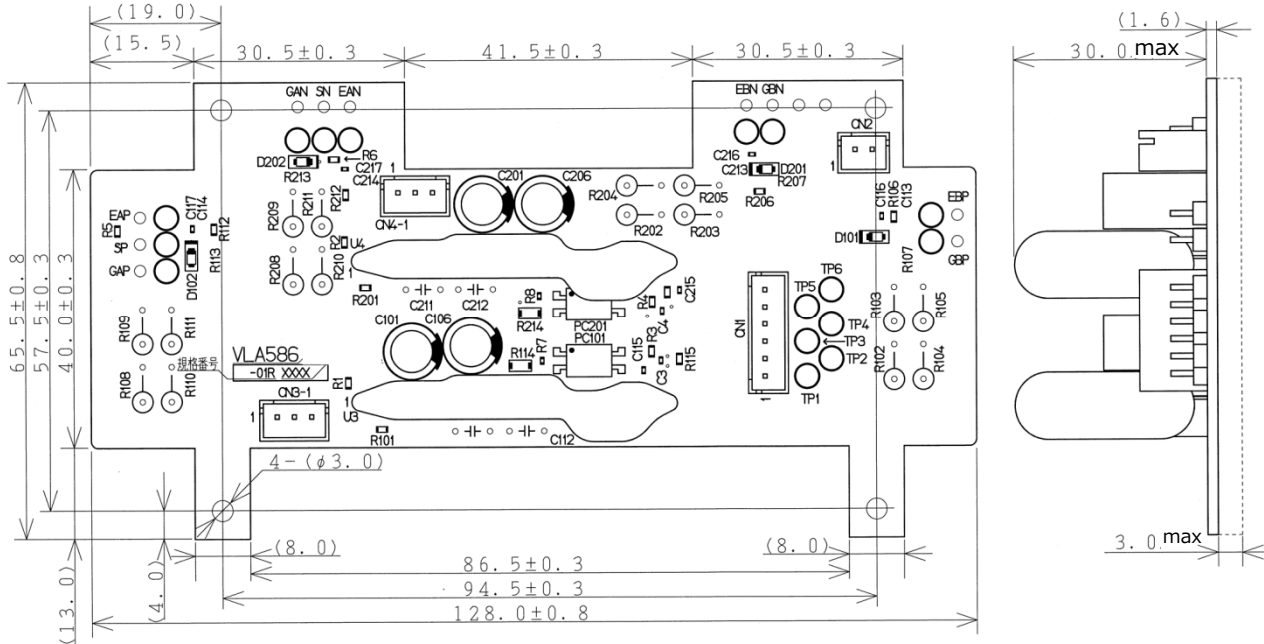
Mountable Unit on Module

VLA586-01R

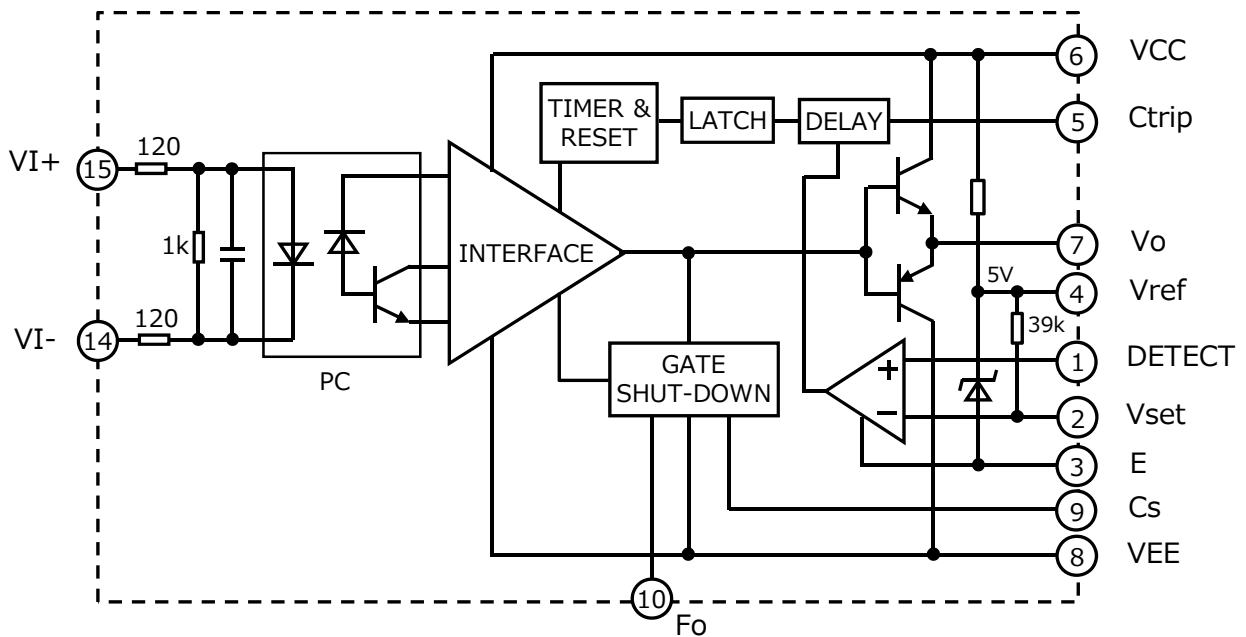
GATE DRIVER FOR Full-SiC MODULE

OUTLINE

単位 : mm



PIN ASSIGNMENT OF INNER CORE HIC



11,12,13 pins are blank.

MAXIMUM RATINGS (Unless otherwise noted, Ta=25°C)

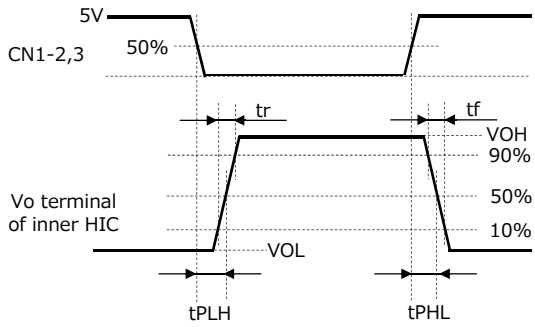
Symbol	Item	Conditions	Ratings	Unit
V _{CC}	Supply voltage	DC	18	V
V _{EE}			-15	
V _{IN}	Supply voltage for gate signal	DC	7	V
IOHP	Output peak current	Pulse width 2us	-7	A
IOLP			7	A
Viso	Isolation voltage between primary and secondary	Sine wave voltage, 60Hz, 1minute	2500	Vrms
Topr	Operating temperature	No condensation allowable	-25 ~ 70	°C
Tstg	Storage temperature	No condensation allowable	-25 ~ 85	°C

ELECTRICAL CHARACTERISTICS(Unless otherwise noted, Ta=25°C, V_{CC}=16V, V_{EE}=-13V, V_{IN}=5V, R_G=2.2Ω)

Symbol	Item	Conditions	Limits			Unit
			Min	Typ	Max	
V _{CC}	Supply voltage	Recommended range	14	16	17	V
V _{EE}			-11	-13	-15	V
V _{IN}	Supply voltage for gate signal	Recommended range	4.75	5	5.25	V
I _{IH}	"H" input signal current	Recommended range	10	13	16	mA
f	Switching frequency	Recommended range	-	-	20	kHz
R _G	Gate resistance	Recommended range	2.2	-	-	Ω
VOH	"H" output voltage	-	14	15	-	V
VOL	"L" output voltage	-	-11	-12	-	V
tPLH	"L-H" propagation time	I _{IH} =13mA	0.2	0.5	1	us
t _r	"L-H" rise time	I _{IH} =13mA	-	0.3	0.8	us
tPHL	"H-L" propagation time	I _{IH} =13mA	0.2	0.4	0.8	us
t _f	"H-L" fall time	I _{IH} =13mA	-	0.3	0.8	us
t _{timer}	Timer	Between start and cancel of protection (Under input signal is off state)	1	-	2	ms
V _{scth}	Threshold voltage of SC detect	Terminal voltage of R1a,R2a on modules	0.63	0.69	0.75	V
T _{d_sc}	Delay time of SC detect	-	-	1.4	1.8	us
T _{d_Fo}	Delay time of detect signal	-	-	12	20	us

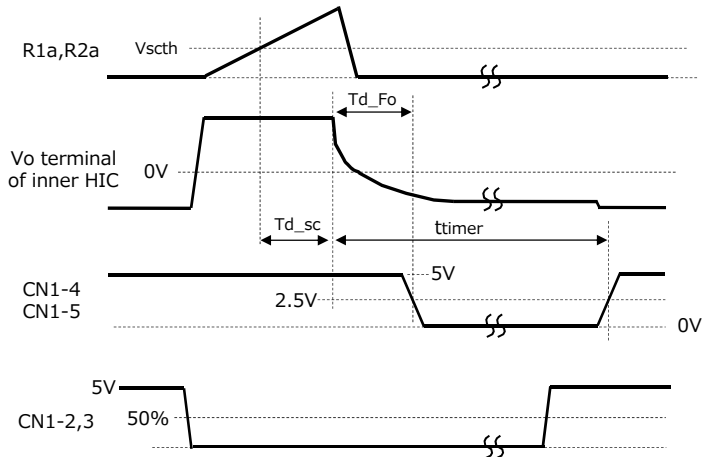
DEFINITION OF CHARACTERISTICS

SWITCHING OPERATION

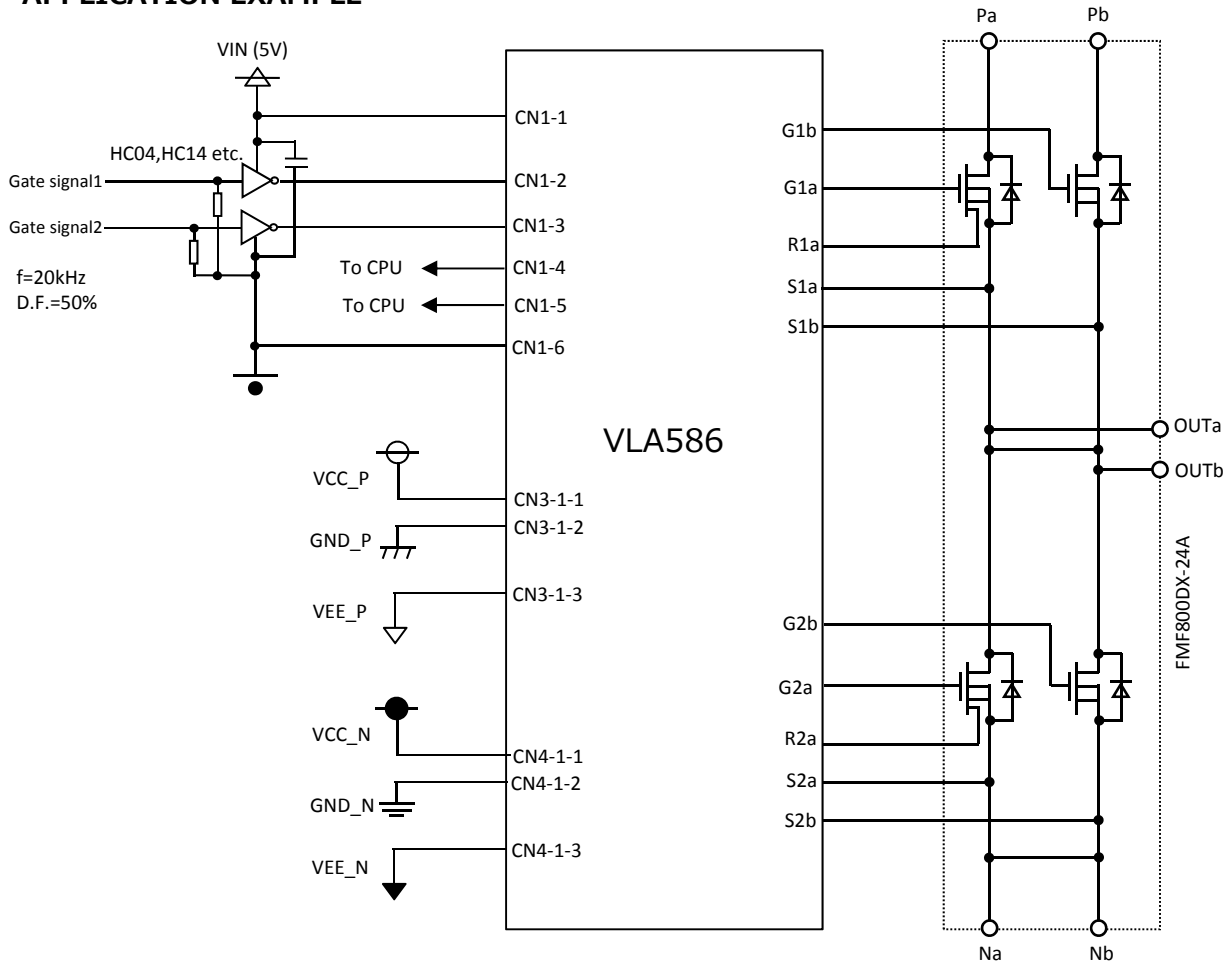


* $R_G=2.2\Omega$, $C_{load}:0.136\mu F$, $f=20kHz$, ON Duty=50%

OPERATION OF SHORT CIRCUIT PROTECTION



APPLICATION EXAMPLE



OPERATION OF PROTECTION CIRCUIT

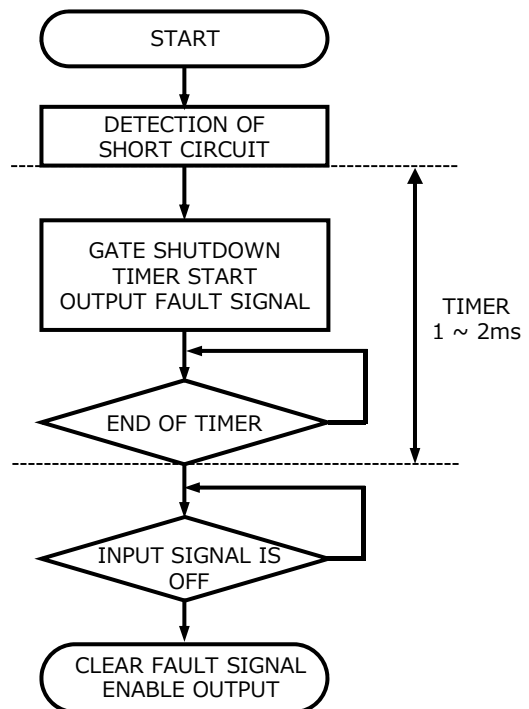
- (1) FMF800DX-24A shunts the current fixed ratio of drain current to terminal of R1a(R2a).
This shunted current flows to detecting resistor(16Ω). This unit detects the short circuit condition by monitoring voltage drop of detecting resistor.
- (2) In case the input signal is "ON" and the terminal voltage of R1a(R2a) is high, this unit will recognize the circuit as short circuit and immediately reduce the gate voltage. Besides, put out Fo signal ("L") which inform that protection circuit is operating at the same time from CN1-4(CN1-5).
- (3) The protection circuit resets and resorts to ordinary condition if input signal is "OFF" when the premised 1~2msec passed. ("OFF" period needs 10us or more)

LATCH & TIMER RESET SYSTEM IN SHORT-CIRCUIT PROTECTION CIRCUIT

Once the short-circuit protection circuit starts, it shuts down the gate output and keeps Fo output, causing the latch status. This status is canceled if the input signal is OFF when specific time passed after the activation of the short-circuit protection circuit. Then, gate output depending on input signals becomes possible. If the input signal is ON when specific time elapses, the latch status is not canceled: it is canceled when the signal becomes OFF.

As mentioned above, on the latch & timer reset system, the latch status is resulted after activation of the protection circuit and shutdown of the gate output. Therefore, during this period, gate output is not made no matter how much input signals are received. For this reason, it is possible to safely stop the entire equipment by sending error signals to the microcomputer during this period to stop all gate signals.

OPERATION FLOW ON DETECTING SHORT CIRCUIT



FOR SAFETY USING

Great detail and careful attention are given to the production activity of Devices, such as the development, the quality of production, and in its reliability. However the reliability of Devices depends not only on their own factors but also in their condition of usage. When handling Devices, please note the following cautions.

CAUTIONS	
Packing	The materials used in packing Devices can only withstand normal external conditions. When exposed to outside shocks, rain and certain environmental contaminants, the packing materials will deteriorates. Please take care in handling.
Carrying	<ol style="list-style-type: none">1) Don't stack boxes too high. Avoid placing heavy materials on boxes.2) Boxes must be positioned correctly during transportation to avoid breakage.3) Don't throw or drop boxes.4) Keep boxes dry. Avoid rain or snow.5) Minimal vibration and shock during transportation is desirable.
Storage	<p>When storing Devices, please observe the following notices or possible deterioration of their electrical characteristics, risk of solder ability, and external damage may occur.</p> <ol style="list-style-type: none">1) Devices must be stored where fluctuation of temperature and humidity is minimal, and must not be exposed to direct sunlight. Store at the normal temperature of 5 to 30 degrees Celsius with humidity at 40 to 60%.2) Avoid locations where corrosive gasses are generated or where much dust accumulates.3) Storage cases must be static proof.4) Avoid putting weight on boxes.
Extended storage	When extended storage is necessary, Devices must be kept non-processed. When using Devices which have been stored for more than one year or under severe conditions, be sure to check that the exterior is free from flaw and other damages.
Maximum ratings	To prevent any electrical damages, use Devices within the maximum ratings. The temperature, current, voltage, etc. must not exceed these conditions.
Polarity	To protect Devices from destruction and deterioration due to wrong insertion, make sure of polarity in inserting leads into the board holes, conforming to the external view for the terminal arrangement.

Keep safety first in your circuit designs!

·ISAHAYA Electronics Corporation puts the maximum effort into making semiconductor products better and more reliable, but there is always the possibility that trouble may occur with them. Trouble with semiconductors may lead to personal injury, fire or property damage. Remember to give due consideration to safety when making your circuit designs, with appropriate measures such as (1) placement of substitutive, auxiliary circuits, (2) use of non-flammable material or (3) prevention against any malfunction or mishap.

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