

**DESCRIPTION**

The VLA526A-06AR is the 6-element gate driver for a 400VAC 3 phase inverter. 3 circuits of high side are isolated between input and output and the power supplies consist of the inside. This Hybrid IC can be driven by input voltage of 2 lines (+15V and +5V). By connecting the resistor for current detection between B-N, this Hybrid IC can detect an over-current, and can cut off each gate signal.

The low side of an input part has a timing revision circuit that can revise time lag with the signal of high side and this hybrid IC can realize the optimum inverter drive.

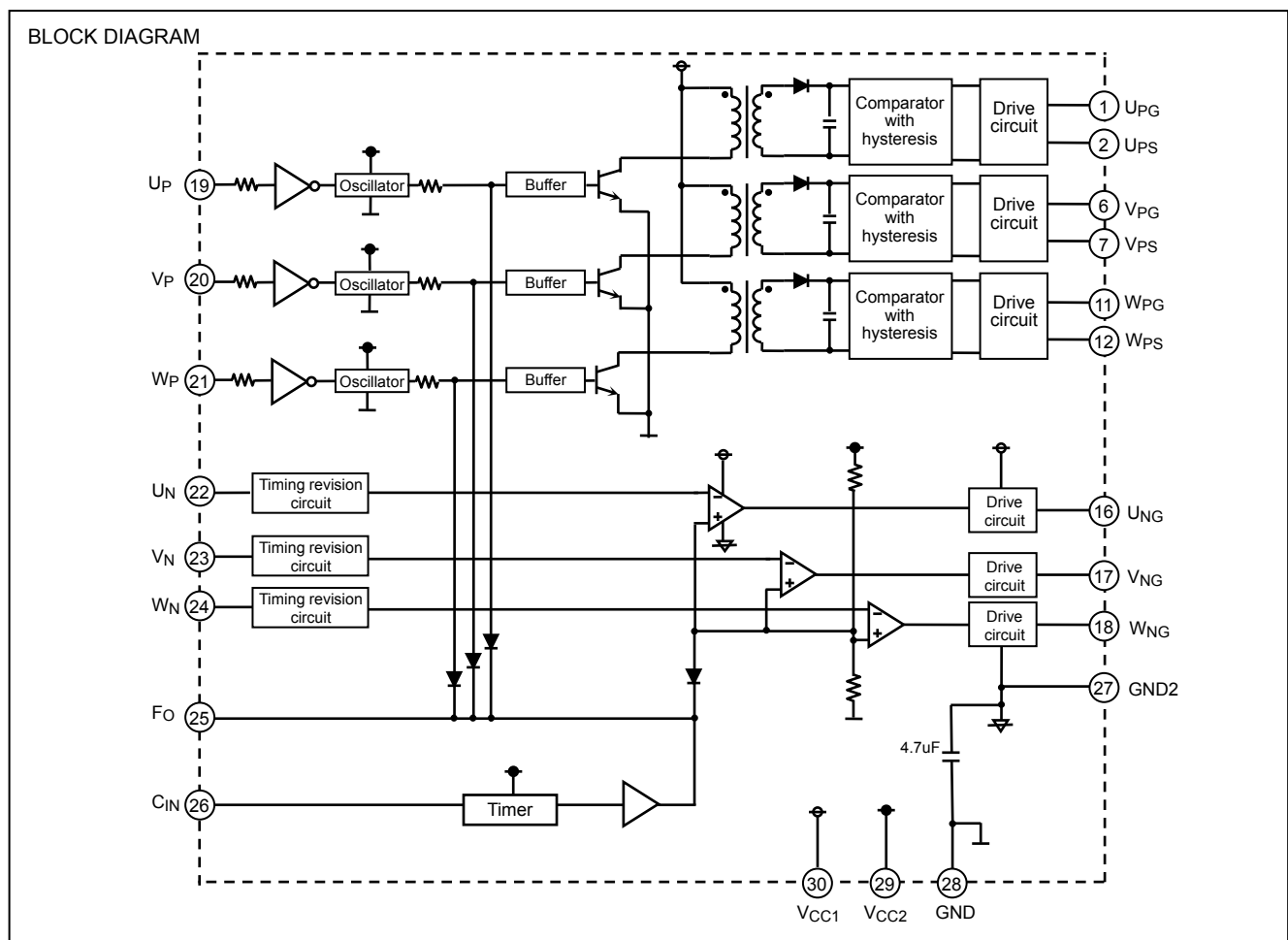
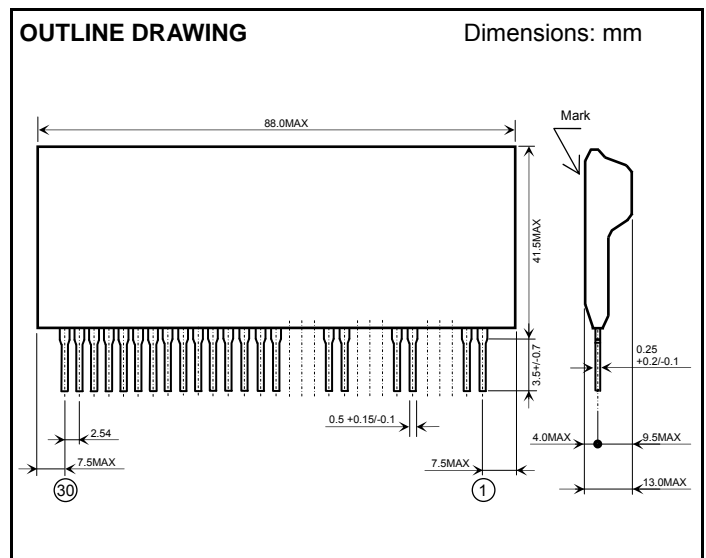
Recommended IGBT module:  $V_{CES}=1200V/$  up to 25A class

**FEATURES**

- Supply voltage .....+5V, +15V
- High side isolation voltage..... 2500Vrms, for 1 min
- The power supply for a high side gate drive and the electrolysis capacitor for voltage compensation are unnecessary.
- SIL structure, 6-circuit driver built-in, it saves area on mother board.
- Recommended switching frequency range is up to 3kHz.

**APPLICATIONS**

IGBT drive for 3 phase inverter etc.



**MAXIMUM RATINGS** (unless otherwise noted,  $T_a=25^\circ\text{C}$ )

Symbol	Parameter	Conditions	Ratings	Unit
$V_{CC1}$	Input voltage 1	DC, between pins 30 and 28	-0.3 ~ 18	V
$V_{CC2}$	Input voltage 2	DC, between pins 29 and 28	-0.5 ~ 5.5	V
$V_{in}, V_{CIN}$	Input/Error signal voltage	Between pins 19, 20, 21, 22, 23, 24, 26 and 28	-0.5 ~ +6	V
$V_{iso1}$	Isolation voltage1	AC, 1min, R.H.<50%. Between input and output of high side.	2500	Vrms
$V_{iso2}$	Isolation voltage2	AC, 1min, R.H.<50%. Between each high side output.	2500	Vrms
$T_C$	Case temperature	—	95	$^\circ\text{C}$
$T_{opr}$	Operating temperature	No condensation	-20 ~ +70	$^\circ\text{C}$
$T_{stg}$	Storage temperature	No condensation	-25 ~ +100	$^\circ\text{C}$

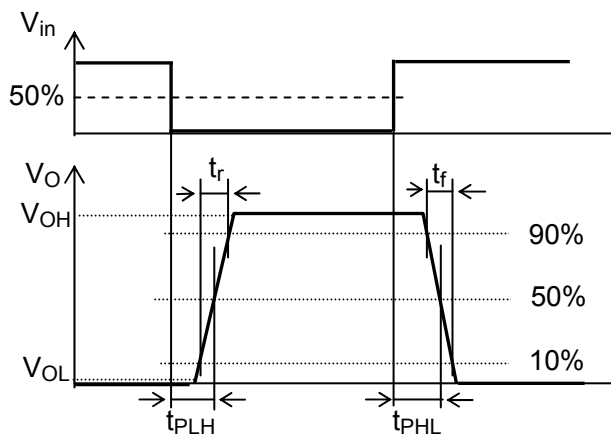
**ELECTRICAL CHARACTERISTICS**(Unless otherwise noted,  $T_a=25^\circ\text{C}$ ,  $V_{CC1} = 15\text{V}$ ,  $V_{CC2} = 5\text{V}$ ,  $f = 3\text{kHz}$ , D.F. = 50%,  $C_L = 0.01\mu\text{F}$ )

Symbol	Item	Conditions	Limits			Unit
			Min	Typ	Max	
$V_{CC1}$	Input voltage 1	Recommended range	14.5	15.0	17.0	V
$V_{CC2}$	Input voltage 2	Recommended range	4.75	5.0	5.25	V
$f$	Switching frequency	Recommended range	—	—	3	kHz
$V_{OH}$	"H" output voltage	$V_{in}$ : "L" and $F_O$ : "H", $I_O = 0\text{A}$	13.5	14.5	18	V
$V_{OL}$	"L" output voltage	$V_{in}$ : "H" or $F_O$ : "L", $I_O = 0\text{A}$	—	0.6	1.4	V
$t_{PLHp}$	"L-H" Propagation time: high side (*)	$V_{in}$ : "L" and $F_O$ : "H", output open	0.75	2.2	—	$\mu\text{s}$
$t_{PHLp}$	"H-L" Propagation time: high side (*)	$V_{in}$ : "H" or $F_O$ : "L", output open	—	1.7	2.6	$\mu\text{s}$
$t_{rp}$	"L-H" Rise time: high side	$V_{in}$ : "L" and $F_O$ : "H"	1.1	2.5	—	$\mu\text{s}$
$t_{fp}$	"H-L" Fall time: high side	$V_{in}$ : "H" or $F_O$ : "L"	—	0.8	1.4	$\mu\text{s}$
$t_{PLHn}$	"L-H" Propagation time: low side	$V_{in}$ : "L" and $F_O$ : "H", output open	0.4	0.7	—	$\mu\text{s}$
$t_{PHLn}$	"H-L" Propagation time: low side	$V_{in}$ : "H" or $F_O$ : "L", output open	—	0.9	1.4	$\mu\text{s}$
$t_{rn}$	"L-H" Rise time: low side	$V_{in}$ : "L" and $F_O$ : "H"	1	1.6	—	$\mu\text{s}$
$t_{fn}$	"H-L" Fall time: low side	$V_{in}$ : "H" or $F_O$ : "L"	—	0.4	0.8	$\mu\text{s}$
$t_p$	Minimum off-pulse width	—	4	—	—	$\mu\text{s}$
$R_{G(on)p}$	Inside gate resistor 1	turn-on, "H" output, high side	—	20	—	$\Omega$
$R_{G(off)p}$	Inside gate resistor 2	turn-off, "L" output, high side	—	10	—	$\Omega$
$R_{G(on)n}$	Inside gate resistor 3	turn-on, "H" output, low side	—	33	—	$\Omega$
$R_{G(off)n}$	Inside gate resistor 4	turn-off, "L" output, low side	—	15	—	$\Omega$
$V_{FOH}$	"H" level $F_O$ output voltage	Normal mode	—	—	$V_{CC2}$	V
$V_{FOL}$	"L" level $F_O$ output voltage	Short-circuit protection operation mode	—	0.2	0.8	V
$t_d$	Set time for timer	Pin 26 $\leq 0.5\text{V}$	—	1.0	5.1	$\mu\text{s}$
$t_{timer}$	Timer	Maintenance time of protection mode, The period of $F_O$ output "L". $t_d \geq 6.5\mu\text{s}$ .	70	—	—	$\mu\text{s}$

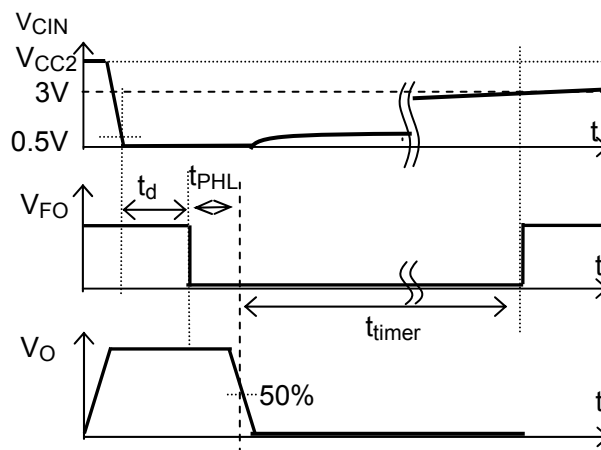
(\*) The time is  $t_d + t_{PHL}$  to cut off gate output after reaching  $V_{CIN} < 0.5\text{V}$ .

**DEFINITION OF CHARACTERISTICS**

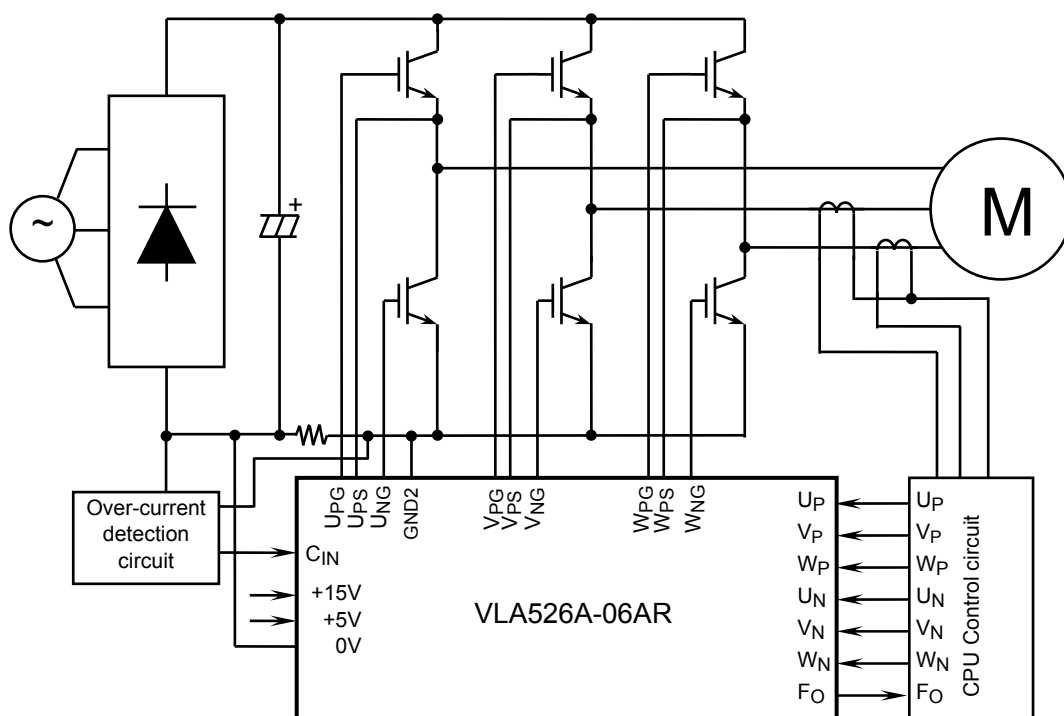
(1) Normal switching mode



(2) Protection operation mode

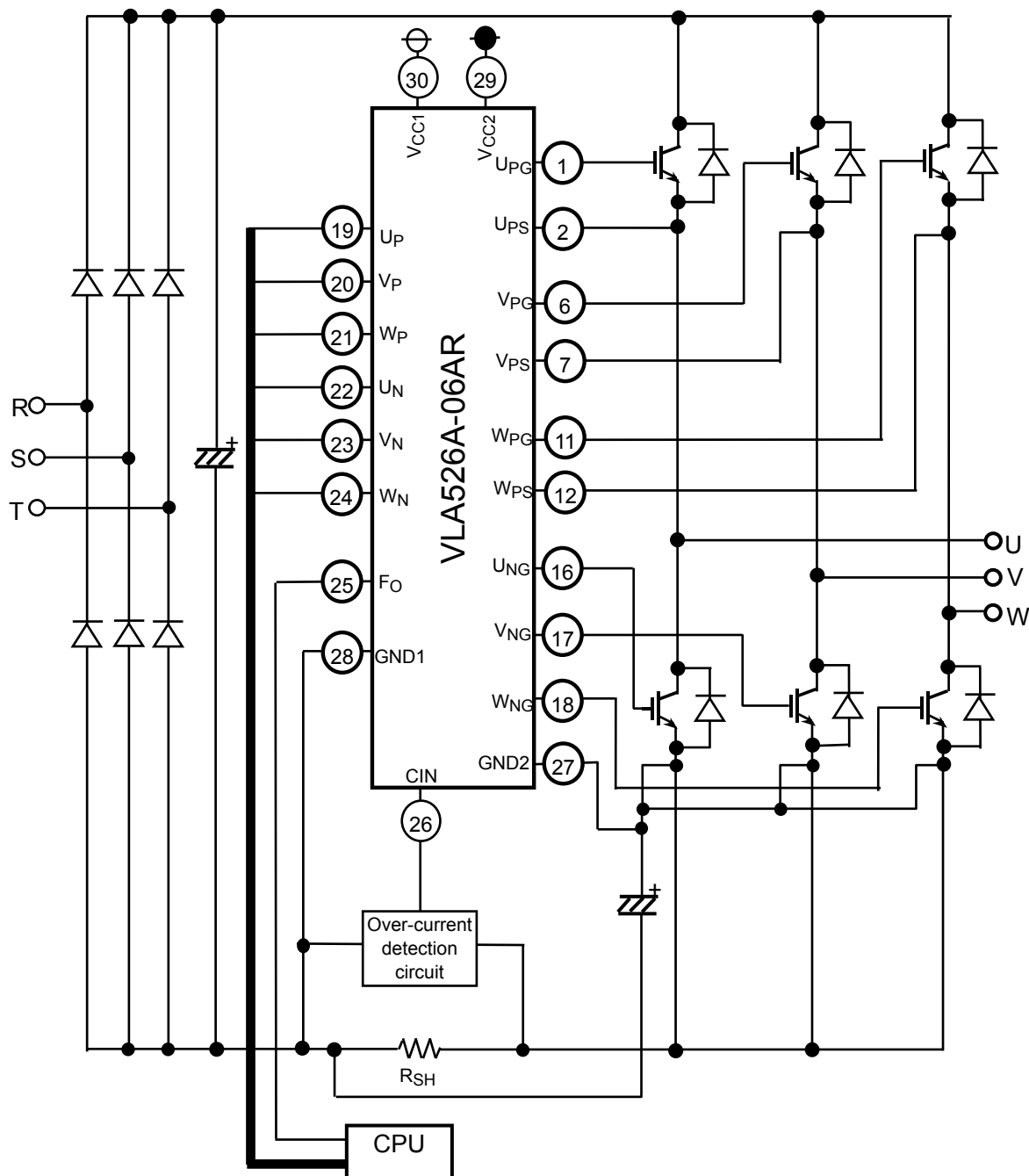


**APPLICATION CIRCUIT**



# VLA526A-06AR

Hybrid IC for driving IGBT modules



**PROTECTION OPERATION MODE**

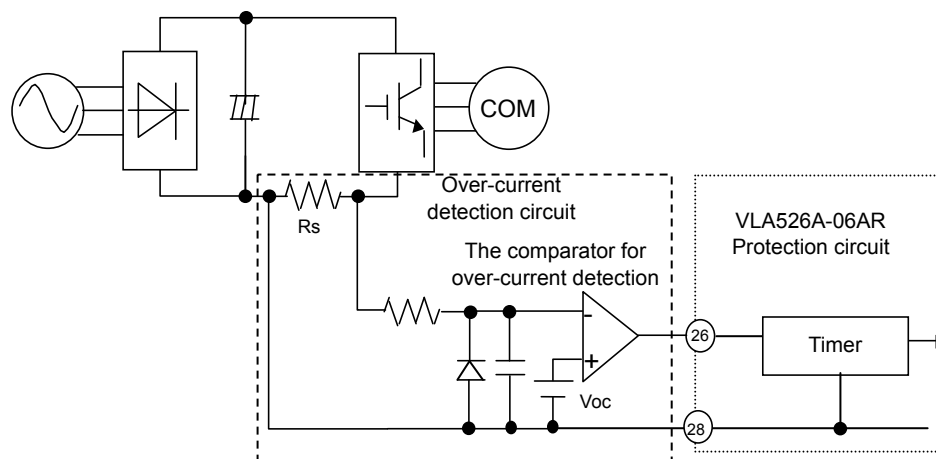
This Hybrid IC has the protection operation function, and it works by detecting the both-ends voltage of the current detection resistor ( $R_s$ ) that is connected between the inverter and converter. (Refer to the following figure)

Specifically, in following procedure, this Hybrid IC suspends the all gate output for timer time when unusual. Detection of the voltage generated by unusual current (error) which flows resistor ( $R_s$ ) when unusual, such as a short-circuit in an inverter main circuit etc. ( $R_s \cdot$  error) The detection voltage and the standard voltage ( $V_{oc}$ ) are compared, and when unusual, the circuit that outputs "L" is constituted and that output is connected to pin 26 of this Hybrid IC.

In addition, protection operation is started only when unusual output "L" is held for  $5.1\mu s$  (max: set time of timer), and by the time it starts protection operation there is delay time for max  $7.7\mu s$ . Moreover, according the current sink capability of a comparator, set time of timer may become long. The length of the timer time in the protection operation mode changes according to unusual judging time, and timer time also becomes longer as an unusual period excels.

(Cautions) As the comparator for over-current detection, it must be open-collector type.

In case of a totem-pole type comparator, a timer circuit becomes invalid.



An example for external circuit to detect over current

**FOR SAFETY USING**

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

CAUTIONS	
Packing	The materials used in packing Hics can only withstand normal external conditions. When exposed to outside shocks, rain and certain environmental contaminants, the packing materials will deteriorate. Please take care in handling.
Carrying	<ol style="list-style-type: none"> <li>1) Don't stack boxes too high. Avoid placing heavy materials on boxes.</li> <li>2) Boxes must be positioned correctly during transportation to avoid breakage.</li> <li>3) Don't throw or drop boxes.</li> <li>4) Keep boxes dry. Avoid rain or snow.</li> <li>5) Minimal vibration and shock during transportation is desirable.</li> </ol>
Storage	<p>When storing Hics, please observe the following notices or possible deterioration of their electrical characteristics, risk of solderability, and external damage may occur.</p> <ol style="list-style-type: none"> <li>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%.</li> <li>2) Avoid locations where corrosive gasses are generated or where much dust accumulates.</li> <li>3) Storage cases must be static proof.</li> <li>4) Avoid putting weight on boxes.</li> </ol>
Extended storage	When extended storage is necessary, Hics must be kept non-processed. When using Hics 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 Hics within the maximum ratings. The temperature, current, voltage, etc. must not exceed these conditions.
Polarity	To protect Hics 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, (2) use of non-flammable material or (3) prevention against any malfunction or mishap.

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