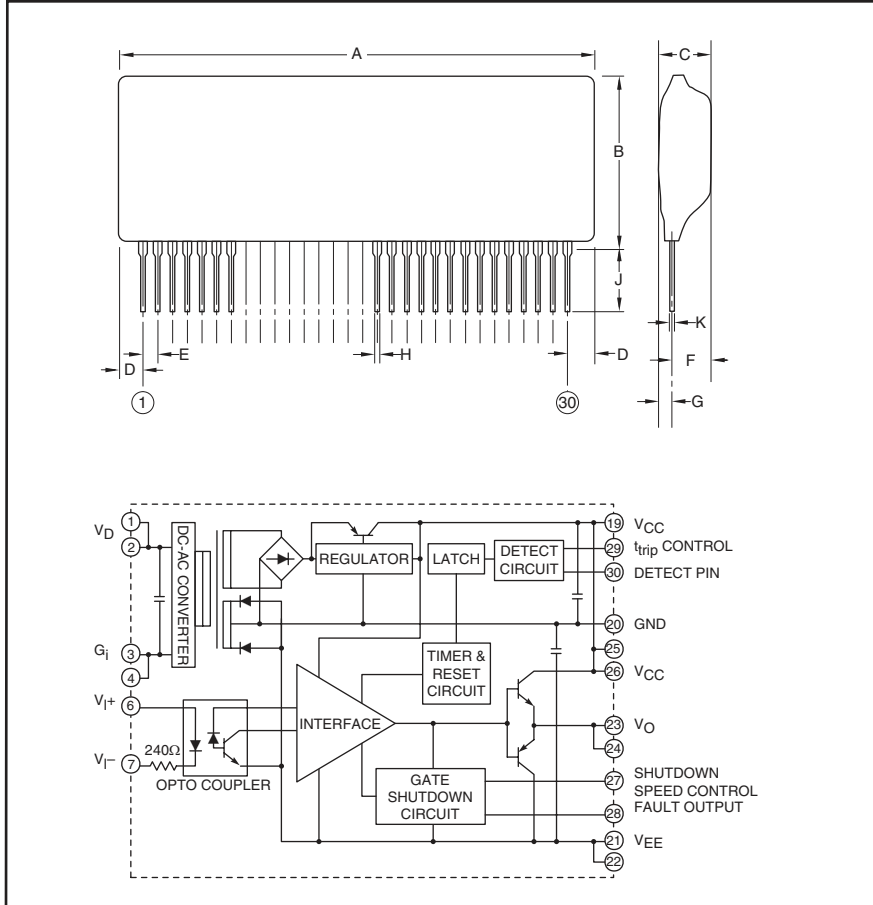
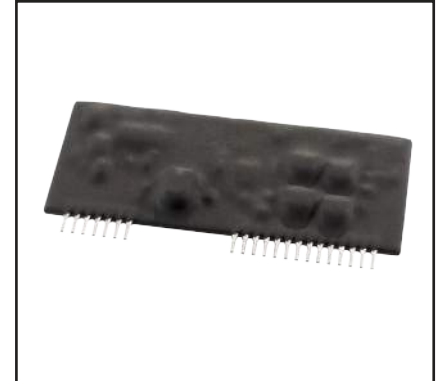


### Hybrid IC IGBT Gate Driver + DC/DC Converter



Outline Drawing and Circuit Diagram

Dimensions	Inches	Millimeters
A	3.46 Max.	88.0 Max.
B	1.65 Max.	42.0 Max.
C	0.67 Max.	17.0 Max.
D	0.31 Max.	8.0 Max.
E	0.1	2.54
F	0.45 Max.	11.5 Max.
G	0.24 Max.	6.0 Max.
H	0.03±0.004	0.75±0.1
J	0.14±0.04	3.5±1.0
K	0.028 Max.	0.7 Max.



#### Description:

VLA539-01R is a hybrid integrated circuit designed for driving IGBT modules. This device is a fully isolated gate drive circuit consisting of an optically isolated gate drive amplifier and an isolated DC-to-DC converter. The gate driver provides an over-current protection function based on desaturation detection.

#### Features:

- Built-in Isolated DC-DC Converter for Gate Drive
- SIP Outline Allows More Space on Mounting Area
- Built-in Short Circuit Protection (With a Pin for Fault Output)
- Variable Fall Time on Short-Circuit Protection
- Electrical Isolation Voltage Between Input and Output (4000 V<sub>rms</sub> for 1 Minute)
- CMOS, TTL Compatible Input

#### Application:

To Drive IGBT modules for general industrial use apparatus.

#### Recommended IGBT Modules:

V<sub>CES</sub> = 600V Series Up to 600A  
V<sub>CES</sub> = 1200V Series Up to 3600A  
V<sub>CES</sub> = 1700V Series Up to 3600A

**VLA539-01R**  
**Hybrid IC Gate Driver +**  
**DC/DC converter**

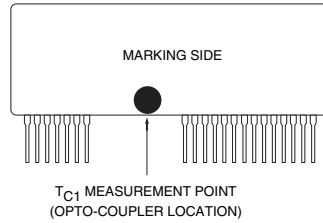
**Absolute Maximum Ratings,  $T_a = 25^\circ\text{C}$  unless otherwise specified**

Characteristics	Symbol	VLA539-01R	Units
Supply Voltage, DC	$V_D$	-1 ~ 16.5	Volts
Input Signal Voltage (Applied between Pin 6-7, 50% Duty Cycle, Pulse Width 1ms)	$V_i$	-1 ~ 7	Volts
Output Current (Pulse Width 3 $\mu$ s)	$I_{OHP}$	-24	Amperes
	$I_{OLP}$	24	Amperes
Isolation Voltage (Sine Wave Voltage 60HZ, for 1 Minute, R.H. <60%)	$V_{ISO}$	4000	$V_{rms}$
Case Temperature1 (Surface Temperature Opto-coupler Location)***	$T_{C1}$	85	$^\circ\text{C}$
Case Temperature2 (Surface Temperature Except Opto-coupler Location)	$T_{C2}$	100	$^\circ\text{C}$
Operating Temperature (No Condensation Allowable)	$T_{opr}$	-20 to 60	$^\circ\text{C}$
Storage Temperature (No Condensation Allowable)	$T_{stg}$	-25 to 100*	$^\circ\text{C}$
Fault Output Current (Applied Pin 28)	$I_{FO}$	20	mA
Input Voltage to Pin 30 (Applied Pin 30)	$V_{R30}$	60	Volts
Gate Drive Current (Average)	$I_{drive}$	210**	mA

\*Differs from temperature cycle condition.

\*\*Refer to  $I_{drive}$  VS.  $T_a$  CHARACTERISTICS (TYPICAL) graph. (Needs Derating)

\*\*\* $T_{C1}$  Measurement Point (opto-coupler location)



**VLA539-01R**  
**Hybrid IC Gate Driver +**  
**DC/DC converter**

**Electrical and Mechanical Characteristics,**

**T<sub>a</sub> = 25°C unless otherwise specified, V<sub>D</sub> = 15V, R<sub>G</sub> = 1Ω, CL = 1.6μF, f = 3kHz**

Characteristics	Symbol	Test Conditions	Min.	Typ.	Max.	Units
Supply Voltage	V <sub>D</sub>	Recommended Range	14.2	15	15.8	Volts
Pull-up Voltage on Input Side	V <sub>IN</sub>	Recommended Range	4.75	5	5.25	Volts
Input Signal Current	I <sub>IH</sub>	Recommended Range	10	12	16	mA
Switching Frequency	f	Recommended Range	—	—	10	kHz
Gate Resistance	R <sub>G</sub>	Recommended Range	0.33	—	—	Ω
Input Signal Current	I <sub>IH</sub>	V <sub>IN</sub> = 5V, HCMOS Drive	—	12	—	mA
Gate Positive Supply Voltage	V <sub>CC</sub>	—	15.2	16.5	17.5	Volts
Gate Negative Supply Voltage	V <sub>EE</sub>	—	-6	-8	-11.5	Volts
Gate Supply Efficiency	E <sub>ta</sub>	Load Current = 210mA $E_{ta} = (V_{CC} +  V_{EE} ) \times 0.21 / (15 \times I_D) \times 100$	60	75	—	%
"H" Output Voltage	V <sub>OH</sub>	10kΩ Connected Between Pin 23-20	14	15.3	16.5	Volts
"L" Output Voltage	V <sub>OL</sub>	10kΩ Connected Between Pin 23-20	-5.5	-7	-11	Volts
"L-H" Propagation Time	t <sub>PLH</sub>	I <sub>IH</sub> = 12mA	0.5	0.9	1.5	μs
"L-H" Rise Time	t <sub>r</sub>	I <sub>IH</sub> = 12mA	—	0.6	1.2	μs
"H-L" Propagation Time	t <sub>PHL</sub>	I <sub>IH</sub> = 12mA	0.5	1.0	1.5	μs
"H-L" Fall Time	t <sub>f</sub>	I <sub>IH</sub> = 12mA	—	0.3	1.2	μs
Timer	t <sub>timer</sub>	Between Start and Cancel (Under Input Sign "L")	1	—	2	ms
Fault Output Current	I <sub>FO</sub>	Applied Pin 28, R = 4.7kΩ	—	5	—	mA
Controlled Time Detect Short-Circuit 1	t <sub>trip1</sub>	Pin 30 : 15V and More, Pin 29 : Open	—	3.5	—	μs
Controlled Time Detect Short-Circuit 2*	t <sub>trip2</sub>	Pin 30 : 15V and More, Pin 29-21, 22 : 10pF (Connective Capacitance)	—	3.9	—	μs
SC Detect Voltage	V <sub>SC</sub>	Collector Voltage of IGBT	15	—	—	Volts

\*Length of wiring from C<sub>trip</sub> to Pins 21, 22, and 29 must be less than 5cm.