

**FEATURES**

- Industry Standard Footprint
- Short Circuit Protection
- Efficiency to 95%
- Wide Input Range
- 1.8V, 2.5V, 3.3V & 5V Output
- Operating Temperature Range -40°C to 85°C
- SMD Construction
- Optional Shutdown & Trim Pins

**DESCRIPTION**

The NGA series is a range of low profile DC/DC converters offering a single regulated output over a wide input voltage range. All parts deliver the full output power up to 85°C without the need for external heatsinking while the synchronous rectification design yields excellent efficiencies up to 95%.

**SELECTION GUIDE<sup>1</sup>**

	Nominal Input Voltage	Output Voltage	Output Current		Nominal Input Current @ Full Load			Power Consumption @ Shutdown			Nominal Efficiency	
			Min Load	Full Load	Min V <sub>IN</sub>	Nom V <sub>IN</sub>	Max V <sub>IN</sub>	Min V <sub>IN</sub>	Nom V <sub>IN</sub>	Max V <sub>IN</sub>	Min V <sub>IN</sub>	Max V <sub>IN</sub>
Order Code	(V)	(V)	A		mA			mW			%	
<b>NGA10S15018S</b>	15	1.8	0	2.0	847	280	160	0.5	4.8	16.1	89	81
<b>NGA10S15025S</b>	15	2.5	0	2.0	1142	380	210	0.5	4.8	16.1	92	85
<b>NGA10S15033S</b>	15	3.3	0	2.0	1478	480	269	0.5	4.8	16.1	94	88
<b>NGA10S15050S<sup>2</sup></b>	15	5.0	0	2.0	1493	705	388	1.0	4.8	16.1	95	92

**INPUT CHARACTERISTICS<sup>1</sup>**

Parameter	Conditions	MIN	TYP	MAX	Units
Voltage Range	Continuous operation	4.75	15	28	VDC
	1.8, 2.5 & 3.3V output types				
	Continuous operation NGA10S15050S	7.0	15	28	
Reflected Ripple Current	Continuous operation NGA10S15050SE	Variable <sup>3</sup>	15	28	mA p-p
	1.8V output types		29		
	2.5V output types		49		
	3.3V output types		48		
	5.0V output types		99		

**OUTPUT CHARACTERISTICS<sup>1</sup>**

Parameter	Conditions	MIN	TYP	MAX	Units
Rated Power	T <sub>A</sub> = -40°C to 85°C			10	W
Voltage Set Point Accuracy			±1.5	±5.0	%
Line Regulation	Low line to high line, with external input/output capacitors, refer to test circuit		0.2	0.5	%/%
Load Regulation	10% load to 100% load, with external input/output capacitors, refer to test circuit		1.5	2.0	%
Ripple & Noise	BW = DC to 20MHz With external input/output capacitors, refer to test circuit		40	70	mVp-p

**ABSOLUTE MAXIMUM RATINGS**

Short circuit protection	Continuous
Internal power dissipation	1.1W
Lead temperature 1.5mm from case for 10 seconds	300°C
Input Voltage V <sub>IN</sub>	28V
Minimum load	0%
Output Trim Control	0V to +5V relative to 0V
Shutdown Control	-0.3V to +28V relative to 0V

**ENVIRONMENTAL<sup>1</sup>**

Parameter	Conditions	MIN	TYP	MAX	Units
Operation		-40		85	°C
Storage		-50		125	°C
PCB Temperature above Ambient			40		°C

**TERMINOLOGY**

**TRANSIENT RESPONSE**

Time for V<sub>OUT</sub> to be within 1% of V<sub>NOM</sub> where  $V_{NOM} = \frac{V_{OUT\ 25\%} + V_{OUT\ 75\%}}{2}$

**OVER-SHOOT/UNDER-SHOOT**

MAX deviation from final steady state output.

**START DELAY**

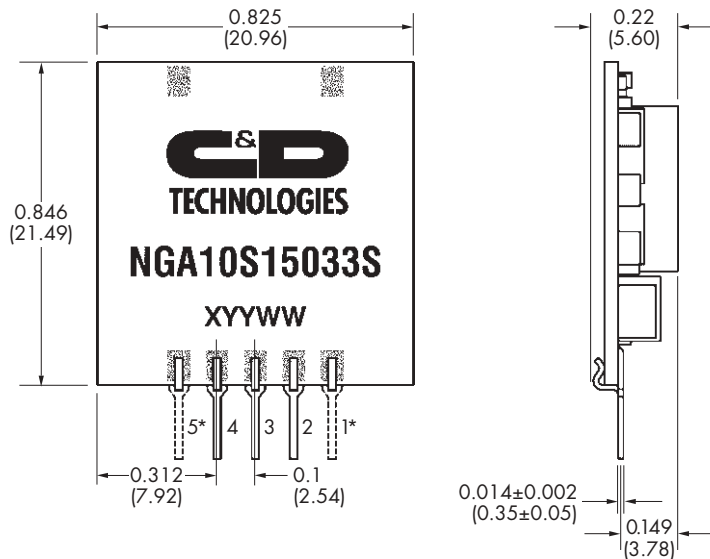
Typical rise time (ms) after control pin high with valid input.

1. Specifications typical at T<sub>A</sub> = 25°C, nominal input voltage and rated output current unless otherwise specified.  
 2. If optional VADJ and SD pin are required (as indicated in the mechanical dimensions diagram) suffix the part number with an E when ordering, i.e. NGA10S15050SE.  
 3. Supply voltage should exceed output voltage by 1.45V.

GENERAL CHARACTERISTICS <sup>1</sup>					
Parameter	Conditions	MIN	TYP	MAX	Units
Switching Frequency		270	300	330	kHz
Transient Response MAX Over-Shoot	50% load change, 1.8V output types		90(160)		mV(μs)
	50% load change, 2.5V output types		84(145)		
	50% load change, 3.3V output types		83(130)		
	50% load change, 5.0V output types		75(40)		
Transient Response MAX Under-Shoot	50% load change, 1.8V output types		64(160)		mV(μs)
	50% load change, 2.5V output types		86(145)		
	50% load change, 3.3V output types		84(120)		
	50% load change, 5.0V output types		74(80)		
Under Voltage Lock Out	1.8, 2.5 & 3.3V output types		4.0		V
	5.0V output types		5.0		
Start Delay	V <sub>IN</sub> MIN to V <sub>IN</sub> MAX		100		ms
ESD	400VDC from 100pF capacitor via 1500Ω resistance		Meets MIL-STD-883E method 3015.7		

**MECHANICAL DIMENSIONS**

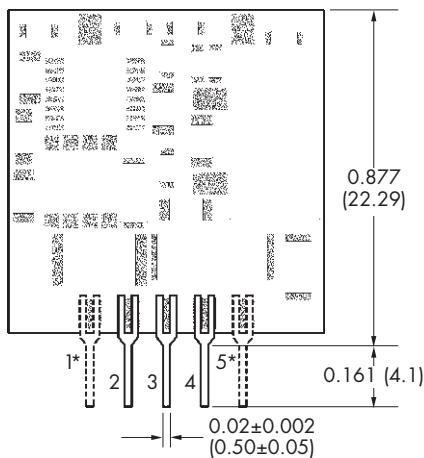
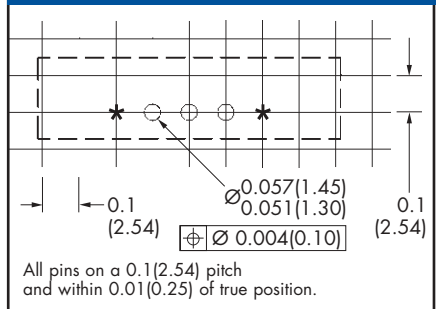
**3 Pin SIP Package Style**



**PIN CONNECTIONS**

Pin Number				
1*	2	3	4	5*
SD	V <sub>IN</sub>	GND	V <sub>OUT</sub>	V <sub>ADJ</sub>

**RECOMMENDED FOOTPRINT DETAILS**



Weight: 4.0g

<sup>1</sup> Specifications typical at T<sub>A</sub> = 25°C, nominal input voltage and rated output current unless otherwise specified.

Unless otherwise stated all dimensions in inches(mm) ±0.01(0.25).

\* Optional pins available on NGA10S15050SE only.

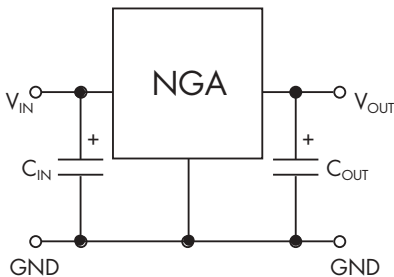
**APPLICATION NOTES**

**EXTERNAL CAPACITANCE**

External capacitors are necessary in order to guarantee stability and full parametric performance over the full line and load range. All parts have been tested and characterised using the following values and test circuit.

Value <sup>1</sup>	
C <sub>IN</sub>	C <sub>OUT</sub>
100µF, 50V	100µF, 10V

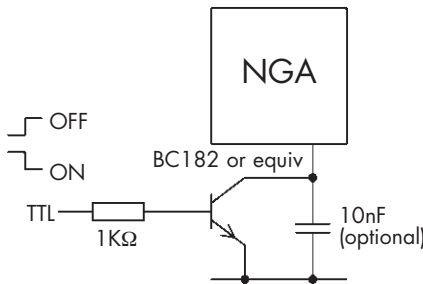
**TEST CIRCUIT**



**SHUTDOWN**

When the shutdown pin is shorted to the 0V, the device's output will be disabled. To shutdown the device the pin should be taken below 0.8V using either an open collector pull down or by using isolated relay contacts. To enable the device output the shutdown pin should be left floating or taken no less than +1.5V to MAX (+28V).

If the shutdown pin is to be connected to a long wire, it is recommended that a capacitor (10nF) decouples the shutdown pin to the 0V in order to avoid the risk of injecting noise into the device circuit.



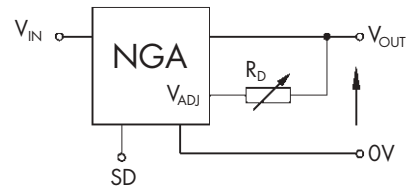
**VOLTAGE TRIMMING**

The trimming (adjust) input on the device allows output voltage adjustment to within ±5%<sup>2</sup> of the desired V<sub>OUT</sub> using a resistor with a value determined by the following equations.

When open circuit, the output will be +5V.

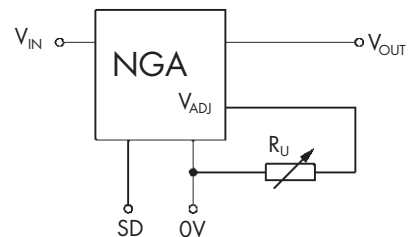
A resistor (R<sub>D</sub>) between the trim pin and the output pin will adjust the output voltage between +5V to +1.8V.

$$\frac{1}{R_D} = (22(1.028V_o - 1))^{-1} - 0.011$$



A resistor (R<sub>U</sub>) between the trim pin and the 0V pin will adjust the device output from +5V to +5.5V.

$$\frac{1}{R_U} = \frac{(1.02V_o) - 1}{91} - 0.0455$$



<sup>1</sup> Specifications typical at T<sub>A</sub> = 25°C, nominal input voltage and rated output current unless otherwise specified.

<sup>2</sup> Accuracy of adjustment is subject to tolerance of resistors and initial output accuracy.

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