

# NGD15N41CL

## Product Preview

## Ignition IGBT 15 Amps, 410 Volts

### N-Channel DPAK

This Logic Level Insulated Gate Bipolar Transistor (IGBT) features monolithic circuitry integrating ESD and Over-Voltage clamped protection for use in inductive coil drivers applications. Primary uses include Ignition, Direct Fuel Injection, or wherever high voltage and high current switching is required.

- Ideal for Coil-on-Plug Applications
- DPAK Package Offers Smaller Footprint and Increased Board Space
- Gate-Emitter ESD Protection
- Temperature Compensated Gate-Collector Voltage Clamp Limits Stress Applied to Load
- Integrated ESD Diode Protection
- New Cell Design Increases Unclamped Inductive Switching (UIS) Energy Per Area
- Short-Circuit Withstand Capability
- Low Threshold Voltage to Interface Power Loads to Logic or Microprocessor Devices
- Low Saturation Voltage
- High Pulsed Current Capability
- Optional Gate Resistor ( $R_G$ ) and Gate-Emitter Resistor ( $R_{GE}$ )

#### MAXIMUM RATINGS ( $T_J = 25^\circ\text{C}$ unless otherwise noted)

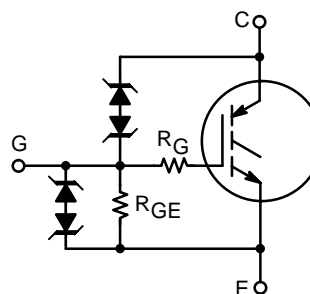
Rating	Symbol	Value	Unit
Collector-Emitter Voltage	$V_{CES}$	440	$V_{DC}$
Collector-Gate Voltage	$V_{CER}$	440	$V_{DC}$
Gate-Emitter Voltage	$V_{GE}$	15	$V_{DC}$
Collector Current-Continuous @ $T_C = 25^\circ\text{C}$	$I_C$	15	$A_{DC}$
Operating and Storage Temperature Range	$T_J, T_{stg}$	-55 to 175	$^\circ\text{C}$



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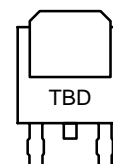
**15 AMPS**  
**410 VOLTS**  
 **$V_{CE(on)} = 2.1 \text{ V MAX}$**



#### MARKING DIAGRAM



DPAK  
CASE 369A  
STYLE 2



TBD = Specific Device Code

#### ORDERING INFORMATION

Device	Package	Shipping
NGD15N41CL	DPAK	75 Units/Rail
NGD15N41CLT4	DPAK	2500/Tape & Reel

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# NGD15N41CL

## UNCLAMPED DRAIN-TO-SOURCE AVALANCHE CHARACTERISTICS ( $T_J < 150^\circ\text{C}$ )

Characteristic	Symbol	Value	Unit
Single Pulse Collector-to-Emitter Avalanche Energy $V_{CC} = 50\text{ V}$ , $V_{GE} = 5\text{ V}$ , Pk $I_L = 16\text{ A}$ , $L = 1.8\text{ mH}$ , Starting $T_J = 25^\circ\text{C}$ $V_{CC} = 50\text{ V}$ , $V_{GE} = 5\text{ V}$ , Pk $I_L = 15\text{ A}$ , $L = 1.8\text{ mH}$ , Starting $T_J = 150^\circ\text{C}$	$E_{AS}$	225 200	mJ

## THERMAL CHARACTERISTICS

Thermal Resistance, Junction to Ambient	PAK	$R_{\theta JA}$	100	$^\circ\text{C/W}$
Maximum Lead Temperature for Soldering Purposes, 1/8" from case for 5 seconds		$T_L$	275	$^\circ\text{C}$

## ELECTRICAL CHARACTERISTICS ( $T_C = 25^\circ\text{C}$ unless otherwise noted)

Characteristic	Symbol	Test Conditions	Min	Typ	Max	Unit
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## OFF CHARACTERISTICS

Collector-Emitter Clamp Voltage	$BV_{CES}$	$I_C = 2\text{ mA}$ $T_J = -40^\circ\text{C}$ to $175^\circ\text{C}$	380	410	440	$V_{DC}$
Zero Gate Voltage Collector Current	$I_{CES}$	$V_{CE} = 300\text{ V}$ , $V_{GE} = 0$ , $T_J = 25^\circ\text{C}$	–	–	40	$\mu\text{A}_{DC}$
		$V_{CE} = 300\text{ V}$ , $V_{GE} = 0$ , $T_J = 150^\circ\text{C}$	–	–	200	
Reverse Collector-Emitter Leakage Current	$I_{ECS}$	$V_{CE} = -24\text{ V}$	–	–	1.0	mA
Gate-Emitter Clamp Voltage	$BV_{GES}$	$I_G = 5\text{ mA}$	10	–	16	$V_{DC}$
Gate Resistor (Optional)	$R_G$	–	–	70	–	$\Omega$
Gate Emitter Resistor (Optional)	$R_{GE}$	–	10	–	26	k $\Omega$

## ON CHARACTERISTICS\*

Gate Threshold Voltage	$V_{GE(th)}$	$I_C = 1\text{ mA}$ $V_{GE} = V_{CE}$	1.0	1.4	2.1	$V_{DC}$
Threshold Temperature Coefficient (Negative)	–	–	–	4.4	–	mV/ $^\circ\text{C}$
Collector-to-Emitter On-Voltage	$V_{CE(on)}$	$I_C = 6\text{ A}$ , $V_{GE} = 4\text{ V}$	–	–	1.8	$V_{DC}$
Collector-to-Emitter On-Voltage	$V_{CE(on)}$	$I_C = 10\text{ A}$ , $V_{GE} = 4.5\text{ V}$ , $T_J = 150^\circ\text{C}$	–	–	2.1	$V_{DC}$

## DYNAMIC CHARACTERISTICS

Input Capacitance	$C_{ISS}$	$V_{CC} = 15\text{ V}$	–	700	–	pF
Output Capacitance	$C_{OSS}$	$V_{GE} = 0\text{ V}$	–	60	–	
Transfer Capacitance	$C_{RSS}$	$f = 1\text{ MHz}$	–	6.0	–	

## SWITCHING CHARACTERISTICS\*

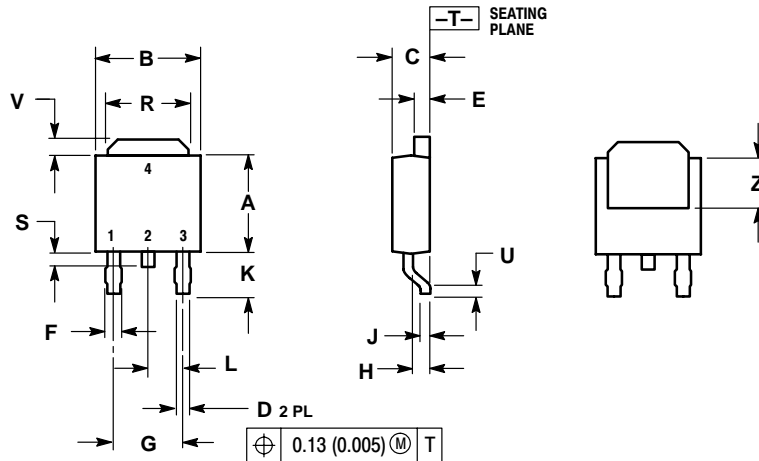
Turn-Off Delay Time	$t_{d(off)}$	$V_{CC} = 300\text{ V}$ , $I_C = 10\text{ A}$	–	4.0	–	$\mu\text{Sec}$
Fall Time	$t_f$	$R_G = 1\text{ k}\Omega$ , $L = 300\text{ }\mu\text{H}$	–	10	–	
Turn-On Delay Time	$t_{d(on)}$	$V_{CC} = 10\text{ V}$ , $I_C = 6.5\text{ A}$	–	1.0	–	$\mu\text{Sec}$
Rise Time	$t_r$	$R_G = 1\text{ k}\Omega$ , $R_L = 1\text{ }\Omega$	–	4.0	–	

\*Pulse Test: Pulse Width  $\leq 300\text{ }\mu\text{s}$ , Duty Cycle  $\leq 2\%$ .

# NGD15N41CL

## PACKAGE DIMENSIONS

### DPAK CASE 369A-13 ISSUE AA



#### NOTES:

1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: INCH.

DIM	INCHES		MILLIMETERS	
	MIN	MAX	MIN	MAX
A	0.235	0.250	5.97	6.35
B	0.250	0.265	6.35	6.73
C	0.086	0.094	2.19	2.38
D	0.027	0.035	0.69	0.88
E	0.033	0.040	0.84	1.01
F	0.037	0.047	0.94	1.19
G	0.180 BSC		4.58 BSC	
H	0.034	0.040	0.87	1.01
J	0.018	0.023	0.46	0.58
K	0.102	0.114	2.60	2.89
L	0.090 BSC		2.29 BSC	
R	0.175	0.215	4.45	5.46
S	0.020	0.050	0.51	1.27
U	0.020	---	0.51	---
V	0.030	0.050	0.77	1.27
Z	0.138	---	3.51	---

#### STYLE 2:

- PIN 1. GATE
2. DRAIN
3. SOURCE
4. DRAIN

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