

Chipsmall Limited consists of a professional team with an average of over 10 year of expertise in the distribution of electronic components. Based in Hongkong, we have already established firm and mutual-benefit business relationships with customers from, Europe, America and south Asia, supplying obsolete and hard-to-find components to meet their specific needs.

With the principle of "Quality Parts, Customers Priority, Honest Operation, and Considerate Service", our business mainly focus on the distribution of electronic components. Line cards we deal with include Microchip, ALPS, ROHM, Xilinx, Pulse, ON, Everlight and Freescale. Main products comprise IC, Modules, Potentiometer, IC Socket, Relay, Connector. Our parts cover such applications as commercial, industrial, and automotives areas.

We are looking forward to setting up business relationship with you and hope to provide you with the best service and solution. Let us make a better world for our industry!



# Contact us

Tel: +86-755-8981 8866 Fax: +86-755-8427 6832

Email & Skype: info@chipsmall.com Web: www.chipsmall.com

Address: A1208, Overseas Decoration Building, #122 Zhenhua RD., Futian, Shenzhen, China







# **IGBT - Field Stop II**

This Insulated Gate Bipolar Transistor (IGBT) features a robust and cost effective Field Stop II Trench construction, and provides superior performance in demanding switching applications, offering both low on state voltage and minimal switching loss. The IGBT is well suited for UPS and solar applications.

#### **Features**

- Extremely Efficient Trench with Field Stop Technology
- $T_{Jmax} = 175$ °C
- Optimized for High Speed Switching
- 5 µs Short-Circuit Capability
- These are Pb–Free Devices

## **Typical Applications**

- Solar Inverters
- Uninterruptible Power Supplies (UPS)
- Welding

#### **ABSOLUTE MAXIMUM RATINGS**

Rating	Symbol	Value	Unit
Collector-emitter voltage	$V_{CES}$	650	V
Collector current @ Tc = 25°C @ Tc = 100°C	I <sub>C</sub>	70 35	А
Pulsed collector current, T <sub>pulse</sub> limited by T <sub>Jmax</sub>	I <sub>CM</sub>	120	Α
Short–circuit withstand time $V_{GE} = 15 \text{ V}, V_{CE} = 400 \text{ V}, $ $T_J \le +150^{\circ}\text{C}$	t <sub>SC</sub>	5	μS
Gate-emitter voltage	$V_{GE}$	±20	V
Transient gate-emitter voltage (T <sub>PULSE</sub> = 5 $\mu$ s, D < 0.10)		±30	V
Power Dissipation @ Tc = 25°C @ Tc = 100°C	P <sub>D</sub>	300 150	W
Operating junction temperature range	$T_J$	-55 to +175	°C
Storage temperature range	T <sub>stg</sub>	-55 to +175	°C
Lead temperature for soldering, 1/8" from case for 5 seconds	T <sub>SLD</sub>	260	°C

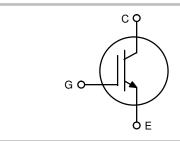
Stresses exceeding those listed in the Maximum Ratings table may damage the device. If any of these limits are exceeded, device functionality should not be assumed, damage may occur and reliability may be affected.

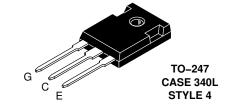


ON Semiconductor®

www.onsemi.com

35 A, 650 V V<sub>CEsat</sub> = 1.70 V E<sub>OFF</sub> = 0.28 mJ





### **MARKING DIAGRAM**



A = Assembly Location

Y = Year WW = Work Week G = Pb-Free Package

#### **ORDERING INFORMATION**

Device	Package	Shipping
NGTG35N65FL2WG	TO-247 (Pb-Free)	30 Units / Rail

### THERMAL CHARACTERISTICS

Rating	Symbol	Value	Unit
Thermal resistance junction-to-case, for IGBT	$R_{ heta JC}$	0.50	°C/W
Thermal resistance junction-to-ambient	$R_{ heta JA}$	40	°C/W

# **ELECTRICAL CHARACTERISTICS** ( $T_J = 25^{\circ}C$ unless otherwise specified)

Parameter	Test Conditions	Symbol	Min	Тур	Max	Unit
STATIC CHARACTERISTIC						
Collector–emitter breakdown voltage, gate–emitter short–circuited	$V_{GE} = 0 \text{ V, } I_{C} = 500  \mu\text{A}$	V <sub>(BR)CES</sub>	650	_	-	V
Collector-emitter saturation voltage	V <sub>GE</sub> = 15 V, I <sub>C</sub> = 35 A V <sub>GE</sub> = 15 V, I <sub>C</sub> = 35 A, T <sub>J</sub> = 175°C	V <sub>CEsat</sub>	1.50 -	1.70 2.20	2.00	V
Gate-emitter threshold voltage	$V_{GE} = V_{CE}, I_{C} = 350 \mu A$	$V_{GE(th)}$	4.5	5.5	6.5	V
Collector-emitter cut-off current, gate- emitter short-circuited	$V_{GE} = 0 \text{ V}, V_{CE} = 650 \text{ V}$ $V_{GE} = 0 \text{ V}, V_{CE} = 650 \text{ V}, T_{J=175^{\circ}\text{C}}$	I <sub>CES</sub>	_ _	_ _	0.5 4.0	mA
Gate leakage current, collector-emitter short-circuited	V <sub>GE</sub> = 20 V , V <sub>CE</sub> = 0 V	I <sub>GES</sub>	-	_	200	nA
DYNAMIC CHARACTERISTIC						
Input capacitance		C <sub>ies</sub>	-	3115	-	pF
Output capacitance	$V_{CE} = 20 \text{ V}, V_{GE} = 0 \text{ V}, f = 1 \text{ MHz}$	C <sub>oes</sub>	-	149	-	
Reverse transfer capacitance	1	C <sub>res</sub>	-	88	-	
Gate charge total		$Q_g$	-	125	-	nC
Gate to emitter charge	$V_{CE} = 480 \text{ V}, I_{C} = 35 \text{ A}, V_{GE} = 15 \text{ V}$	Q <sub>ge</sub>	-	30	-	
Gate to collector charge	1	Q <sub>gc</sub>	-	63	-	
SWITCHING CHARACTERISTIC, INDUC	TIVE LOAD					
Turn-on delay time		t <sub>d(on)</sub>	-	72	-	ns
Rise time	1	t <sub>r</sub>	-	40	-	1
Turn-off delay time	T <sub>J</sub> = 25°C	t <sub>d(off)</sub>	-	132	-	1
Fall time	$V_{CC} = 400 \text{ V}, I_{C} = 35 \text{ A}$ $R_{q} = 10 \Omega$	t <sub>f</sub>	-	75	-	1
Turn-on switching loss	$V_{GE} = 0 \text{ V/ } 15 \text{ V*}$	E <sub>on</sub>	-	0.84	-	mJ
Turn-off switching loss	1	E <sub>off</sub>	-	0.28	-	1
Total switching loss	1	E <sub>ts</sub>	-	1.12	-	1
Turn-on delay time		t <sub>d(on)</sub>	-	70	-	ns
Rise time	1	t <sub>r</sub>	-	38	-	1
Turn-off delay time	T <sub>J</sub> = 150°C	t <sub>d(off)</sub>	-	135	-	1
Fall time	$V_{CC} = 400 \text{ V}, I_{C} = 35 \text{ A}$ $R_{c} = 10 \text{ O}$	t <sub>f</sub>	-	96	-	1
Turn-on switching loss	$R_g = 10 \Omega$ $V_{GE} = 0 \text{ V/ } 15 \text{ V*}$	E <sub>on</sub>	_	1.05	-	mJ
Turn-off switching loss	1	E <sub>off</sub>	_	0.50	-	1
Total switching loss		E <sub>ts</sub>	_	1.55	_	1

Product parametric performance is indicated in the Electrical Characteristics for the listed test conditions, unless otherwise noted. Product performance may not be indicated by the Electrical Characteristics if operated under different conditions.
\*Includes diode reverse recovery loss using NGTG35N65FL2WG.

#### TYPICAL CHARACTERISTICS

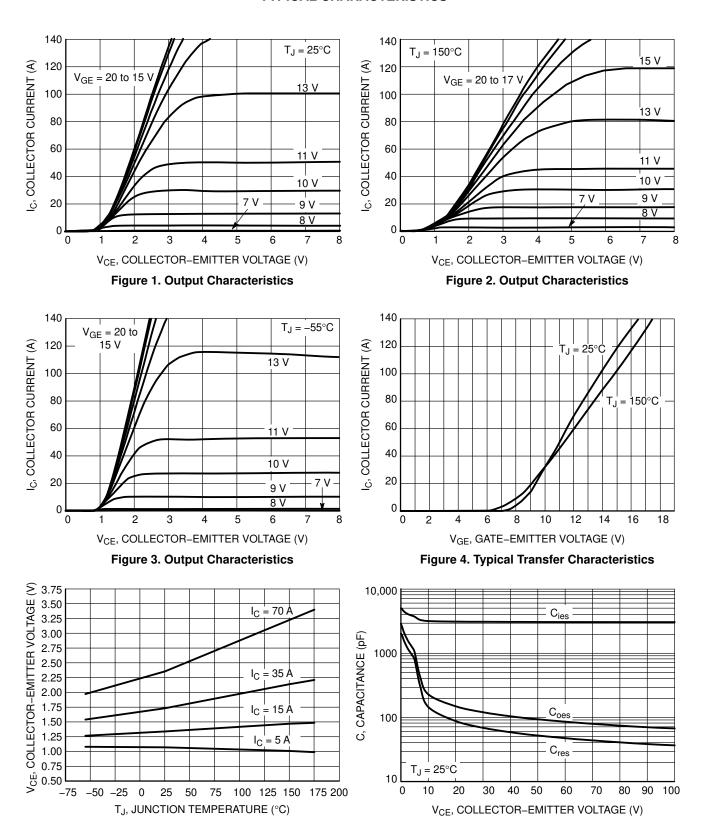


Figure 6. Typical Capacitance

Figure 5. V<sub>CE(sat)</sub> vs. T<sub>J</sub>

#### TYPICAL CHARACTERISTICS

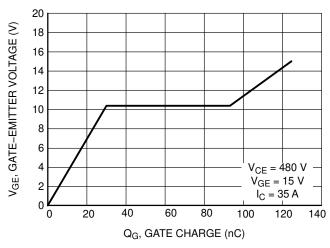


Figure 7. Typical Gate Charge

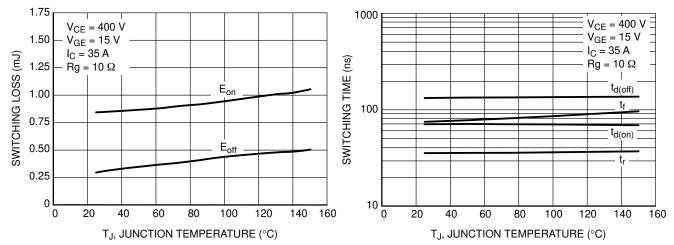


Figure 8. Switching Loss vs. Temperature

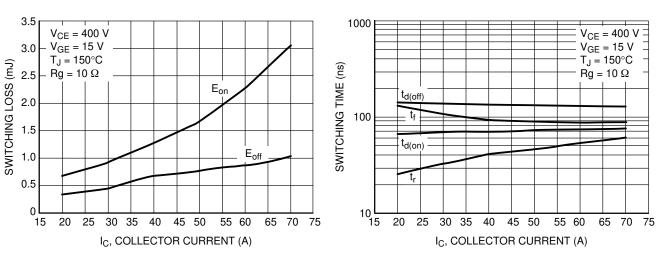
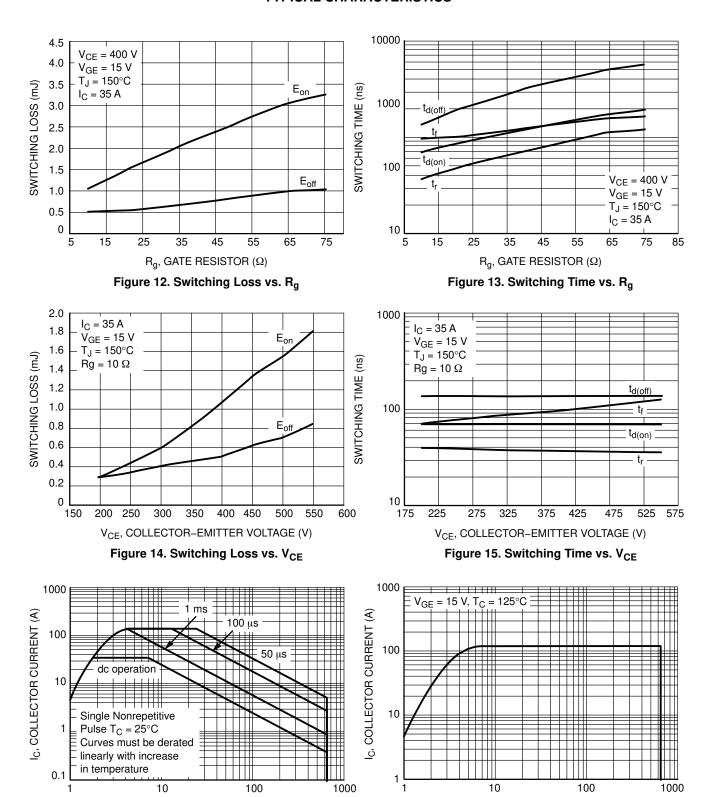


Figure 10. Switching Loss vs. I<sub>C</sub>

Figure 11. Switching Time vs. I<sub>C</sub>

Figure 9. Switching Time vs. Temperature

#### TYPICAL CHARACTERISTICS



 $\label{eq:VCE} V_{CE}, \mbox{COLLECTOR-EMITTER VOLTAGE (V)} \\$  Figure 17. Reverse Bias Safe Operating Area

V<sub>CE</sub>, COLLECTOR-EMITTER VOLTAGE (V)

Figure 16. Safe Operating Area

## **TYPICAL CHARACTERISTICS**

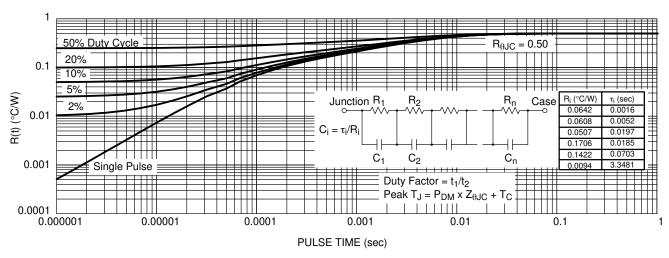
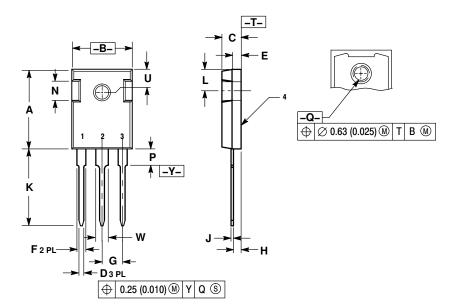


Figure 18. IGBT Transient Thermal Impedance

#### PACKAGE DIMENSIONS

TO-247 CASE 340L-02 ISSUE F



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

	MILLIMETERS		INCHES		
DIM	MIN	MAX	MIN	MAX	
Α	20.32	21.08	0.800	8.30	
В	15.75	16.26	0.620	0.640	
С	4.70	5.30	0.185	0.209	
D	1.00	1.40	0.040	0.055	
Е	1.90	2.60	0.075	0.102	
F	1.65	2.13	0.065	0.084	
G	5.45 BSC		0.215 BSC		
Н	1.50	2.49	0.059	0.098	
7	0.40	0.80	0.016	0.031	
K	19.81	20.83	0.780	0.820	
L	5.40	6.20	0.212	0.244	
N	4.32	5.49	0.170	0.216	
P		4.50		0.177	
Q	3.55	3.65	0.140	0.144	
U	6.15 BSC		0.242 BSC		
w	2.87	3.12	0.113	0.123	

#### STYLE 4:

- PIN 1. GATE 2. COLLECTOR

  - 3. EMITTER 4 COLLECTOR

ON Semiconductor and in are trademarks of Semiconductor Components Industries, LLC dba ON Semiconductor or its subsidiaries in the United States and/or other countries. ON Semiconductor owns the rights to a number of patents, trademarks, copyrights, trade secrets, and other intellectual property. A listing of ON Semiconductor's product/patent coverage may be accessed at <a href="https://www.onsemi.com/site/pdt/Patent-Marking.pdf">www.onsemi.com/site/pdt/Patent-Marking.pdf</a>. ON Semiconductor reserves the right to make changes without further notice to any products herein. ON Semiconductor makes no warranty, representation or guarantee regarding the suitability of its products for any particular purpose, nor does ON Semiconductor assume any liability arising out of the application or use of any product or circuit, and specifically disclaims any and all liability, including without limitation special, consequential or incidental damages. Buyer is responsible for its products and applications using ON Semiconductor products, including compliance with all laws, regulations and safety requirements or standards, regardless of any support or applications information provided by ON Semiconductor. "Typical" parameters which may be provided in ON Semiconductor data sheets and/or specifications can and do vary in different applications and actual performance may vary over time. All operating parameters, including "Typicals" must be validated for each customer application by customer's technical experts. ON Semiconductor does not convey any license under its patent rights nor the rights of others. ON Semiconductor products are not designed, intended, or authorized for use as a critical component in life support systems or any FDA Class 3 medical devices or medical devices with a same or similar classification in a foreign jurisdiction or any devices intended for implantation in the human body. Should Buyer purchase or use ON Semiconductor products for any such unintended or unauthorized application, Buyer shall indemnify and hold ON Semiconductor and its officers, employees, subsidiaries, affiliates, and distributors harmless against all claims, costs, damages, and expenses, and reasonable attorney fees arising out of, directly or indirectly, any claim of personal injury or death associated with such unintended or unauthorized use, even if such claim alleges that ON Semiconductor was negligent regarding the design or manufacture of the part. ON Semiconductor is an Equal Opportunity/Affirmative Action Employer. This literature is subject to all applicable copyright laws and is not for resale in any manner.

#### **PUBLICATION ORDERING INFORMATION**

#### LITERATURE FULFILLMENT

Literature Distribution Center for ON Semiconductor 19521 E. 32nd Pkwy, Aurora, Colorado 80011 USA Phone: 303-675-2175 or 800-344-3860 Toll Free USA/Canada Fax: 303-675-2176 or 800-344-3867 Toll Free USA/Canada Email: orderlit@onsemi.com

N. American Technical Support: 800-282-9855 Toll Free

Europe, Middle East and Africa Technical Support: Phone: 421 33 790 2910

Japan Customer Focus Center Phone: 81-3-5817-1050

ON Semiconductor Website: www.onsemi.com

Order Literature: http://www.onsemi.com/orderlit

For additional information, please contact your local Sales Representative