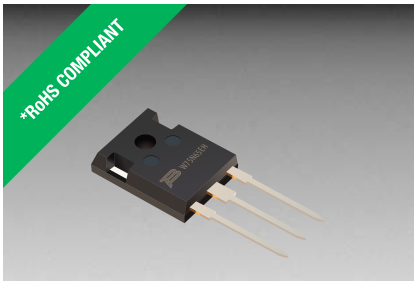


BOURNS®

Features

- 650 V, 75 A, Low Collector-Emitter Saturation Voltage ($V_{CE(sat)}$)
- Novel trench-gate field-stop technology
- Optimized for conduction
- High-speed switching
- Maximum operating T_j = 175 °C
- RoHS compliant*

Applications

- Switched-Mode Power Supplies (SMPS)
- Uninterruptible Power Sources (UPS)
- Power Factor Correction (PFC)
- Inverters
- Welding converters
- Photovoltaic

BIDW75N65EH5 Insulated Gate Bipolar Transistor (IGBT)

General Information

The Bourns® Model BIDW75N65EH5 IGBT device combines technology from a MOS gate and a bipolar transistor, resulting in an optimum component for high voltage and high current applications. This device uses Trench-Gate Field-Stop technology providing greater control of dynamic characteristics while resulting in a lower Collector-Emitter Saturation Voltage ($V_{CE(sat)}$) and fewer switching losses.

Additional Information

Click these links for more information:

PRODUCT SELECTOR | TECHNICAL LIBRARY | INVENTORY | SAMPLES | CONTACT

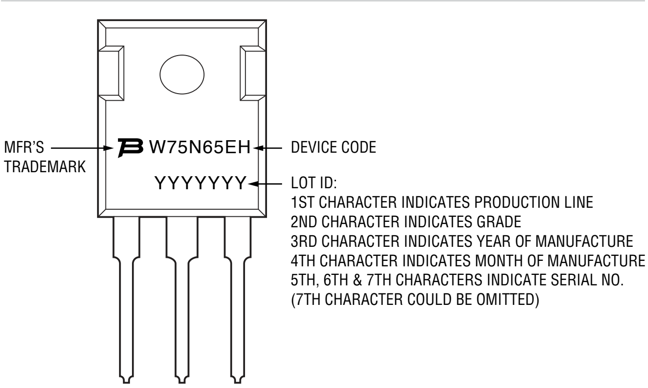
Maximum Electrical Ratings (T_C = 25 °C, unless otherwise specified)

Parameter	Symbol	Value	Unit
Collector-Emitter Voltage	V_{CES}	650	V
Continuous Collector Current (T_C = 25 °C), limited by T_{jmax}	I_C	150	A
Continuous Collector Current (T_C = 100 °C), limited by T_{jmax}	I_C	75	A
Pulsed Collector Current, t_p limited by T_{jmax}	I_{CP}	300	A
Gate-Emitter Voltage	V_{GE}	±20	V
Gate-Emitter Voltage (t_p ≤10 μs, D < 1 %)	V_{GE}	±30	V
Continuous Forward Current (T_C = 100 °C), limited by T_{jmax}	I_F	75	A
Total Power Dissipation	P_{total}	394	W
Storage Temperature	T_{STG}	-55 to +150	°C
Operating Junction Temperature	T_j	-40 to +175	°C

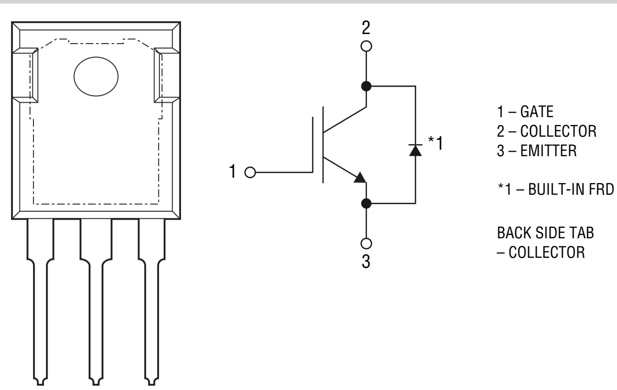
Thermal Resistance

Parameter	Symbol	Max	Unit
IGBT Thermal Resistance Junction - Case	$R_{th(j-c)\_IGBT}$	0.38	°C/W
Diode Thermal Resistance Junction - Case	$R_{th(j-c)\_Diode}$	0.4	°C/W

Typical Part Marking



Internal Circuit



WARNING Cancer and Reproductive Harm
www.P65Warnings.ca.gov

*RoHS Directive 2015/863, Mar 31, 2015 and Annex.
Specifications are subject to change without notice.
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Static Electrical Characteristics (T_C = 25 °C, Unless Otherwise Specified)

Parameter	Symbol	Conditions	Value			Unit
			Min.	Typ.	Max.	
Collector-Emitter Breakdown Voltage	BV_{CES}	V_{GE} = 0 V, I_C = 250 μA	650	—	—	V
Collector-Emitter Saturation Voltage	$V_{CE(sat)}$	V_{GE} = 15 V, I_C = 75 A, T_C= 25 °C	—	1.65	2.2	V
		V_{GE} = 15 V, I_C = 75 A, T_C= 150 °C	—	2.05	—	
Diode Forward On-Voltage	V_F	I_F = 75 A, T_C = 25 °C	—	1.55	1.9	V
		I_F = 75 A, T_C = 150 °C	—	1.45	—	V
Gate Threshold Voltage	$V_{GE(th)}$	V_{CE} = V_{GE}, I_C = 250 μA	3.2	4.0	4.8	V
Collector Cut-off Current	I_{CES}	V_{GE} = 0 V, V_{CE} = 650 V	—	—	75	μA
Gate-Emitter Leakage Current	I_{GES}	V_{CE} = 0 V, V_{GE} = ± 20 V	—	—	±100	nA

Dynamic Electrical Characteristics (T_C = 25 °C, Unless Otherwise Specified)

Parameter	Symbol	Conditions	Value			Unit
			Min.	Typ.	Max.	
Input Capacitance	C_{ies}	V_{CE} = 30 V, V_{GE} = 0 V, f = 1 MHz	—	4829	—	pF
Output Capacitance	C_{oes}		—	132	—	
Reverse Transfer Capacitance	C_{res}		—	21	—	
Total Gate Charge	Q_g	V_{CE} = 520 V, V_{GE} = 15 V, I_C = 75.0 A	—	186	—	nC
Gate-Emitter Charge	Q_{ge}		—	38	—	
Gate-Collector Charge	Q_{gc}		—	50	—	

IGBT Switching Characteristics (Inductive Load, T_C = 25 °C, unless otherwise specified)

Parameter	Symbol	Conditions	Value			Unit
			Min.	Typ.	Max.	
Turn-on Delay Time	$t_{d(on)}$	V_{CE} = 400 V, V_{GE} = 15 V, I_C = 75.0 A, R_G = 10 Ω	—	39	—	ns
Current Rise Time	t_r		—	44	—	ns
Turn-off Delay Time	$t_{d(off)}$		—	186	—	ns
Current Fall Time	t_f		—	38	—	ns
Turn-on Switching Energy	E_{on}		—	2.39	—	mJ
Turn-off Switching Energy	E_{off}		—	0.9	—	mJ
Total Switching Energy	E_{ts}		—	3.29	—	mJ

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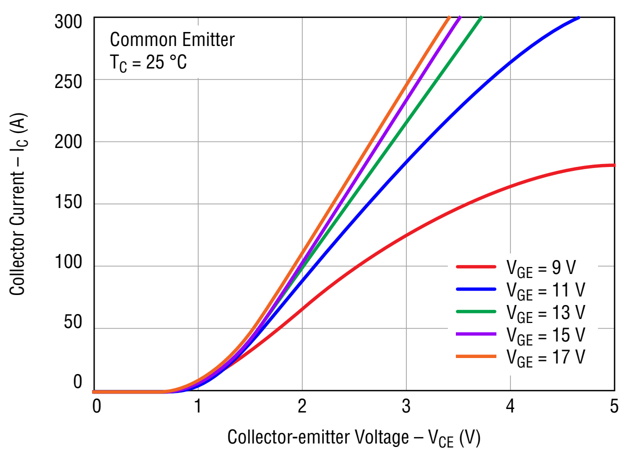
Diode Switching Characteristics (T_C = 25 °C, unless otherwise specified)

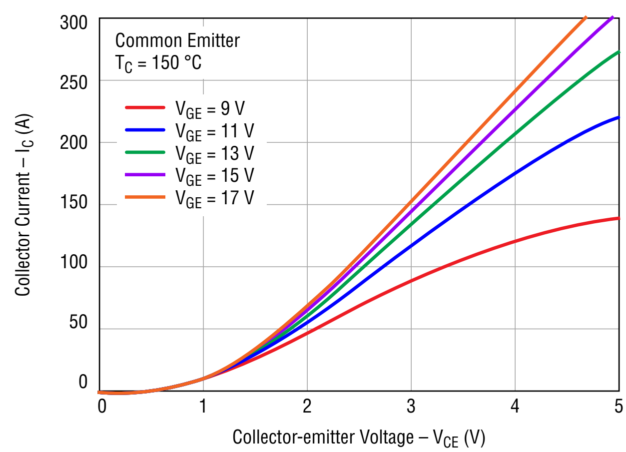
Parameter	Symbol	Conditions	Value			Unit
			Min.	Typ.	Max.	
Reverse Recovery Time	t_{rr}	dI_F/dt = 200 A/μs, I_F = 75.0 A	—	120	—	ns
Reverse Recovery Charge	Q_{rr}		—	0.4	—	μC

Electrical Characteristic Performance

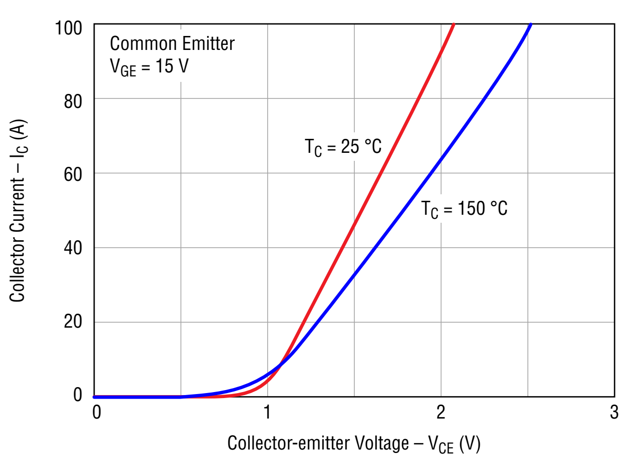
Typical Output Characteristics @ T_C = 25 °C



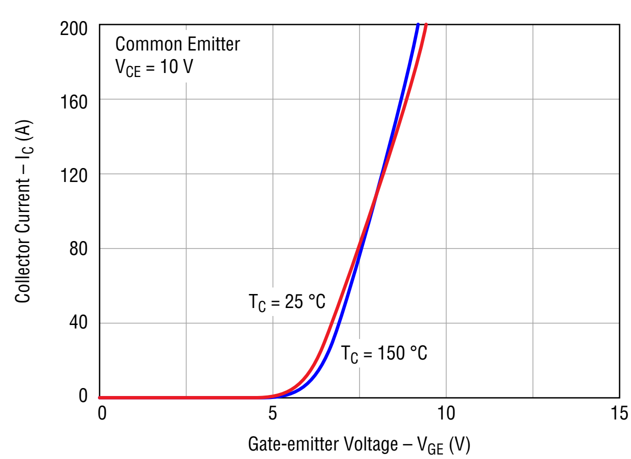
Typical Output Characteristics @ T_C = 150 °C



Typical Saturation Voltage Characteristics



Typical Transfer Characteristics



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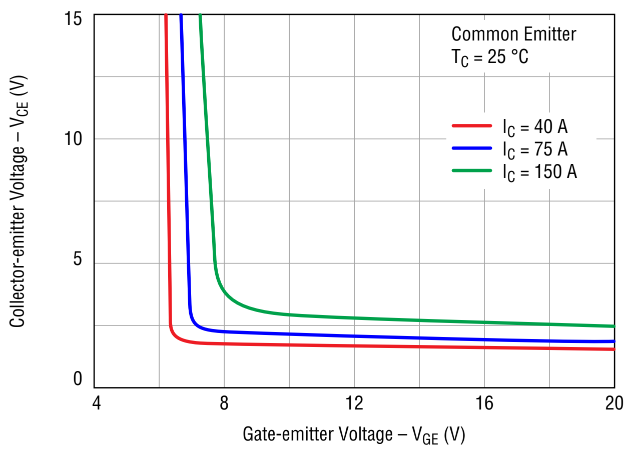
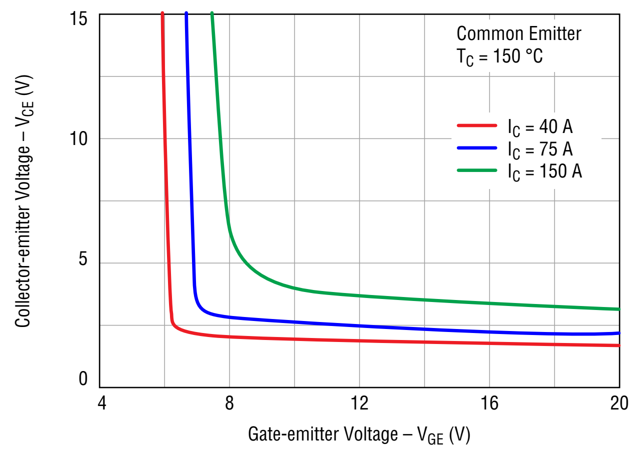
Electrical Characteristic Performance (continued)

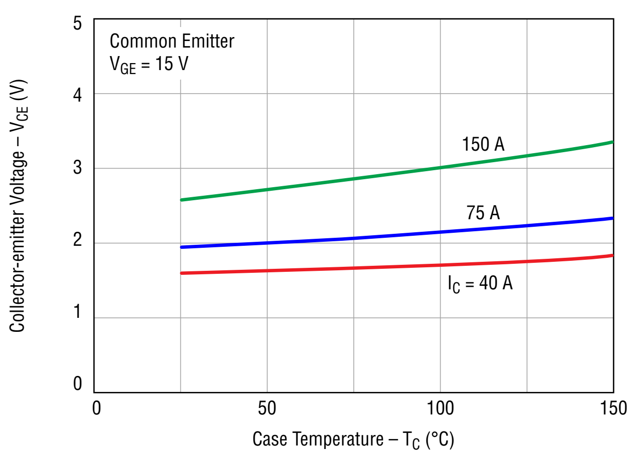
Typical Saturation Voltage Drop vs V_{GE} @ T_C = 25 °C



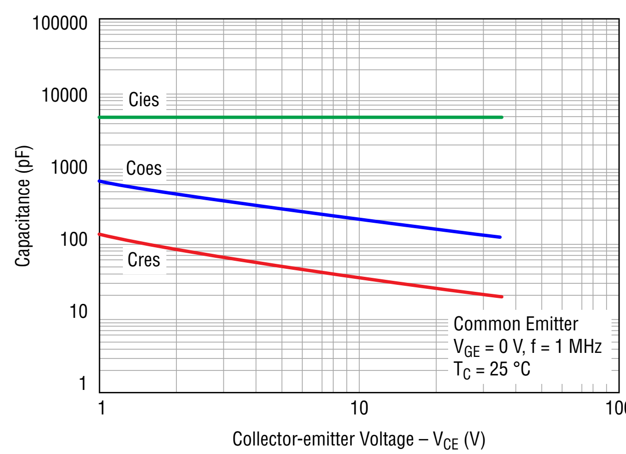
Typical Saturation Voltage Drop vs V_{GE} @ T_C = 150 °C



Typical Saturation Voltage Drop vs Temperature



Typical Capacitance Characteristics



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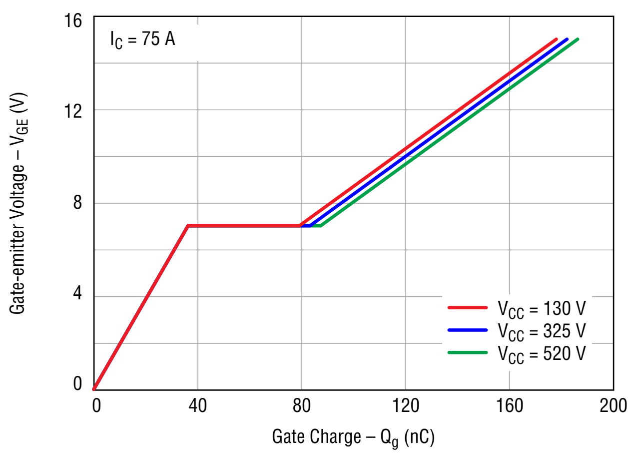
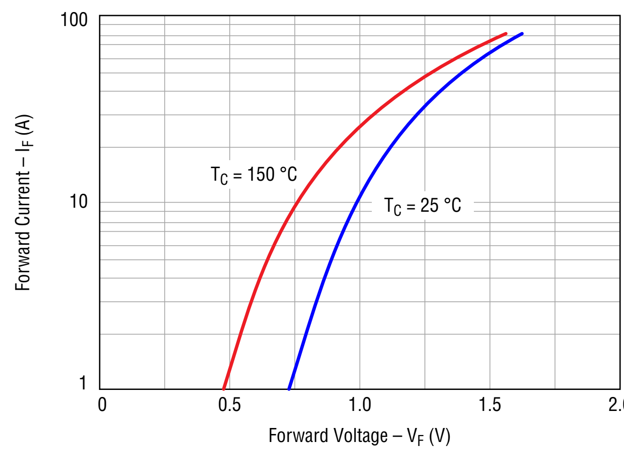
Electrical Characteristic Performance (continued)

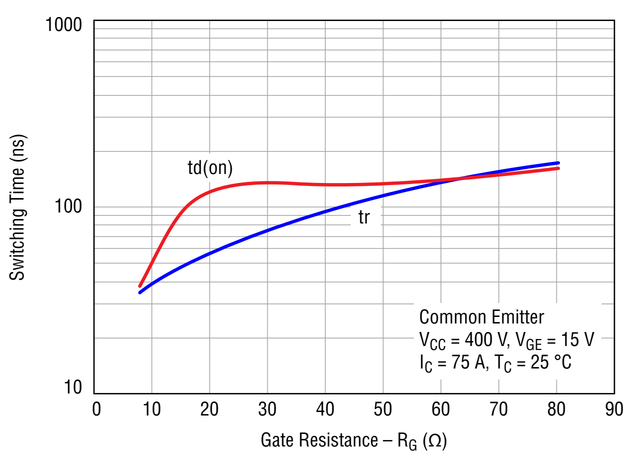
Typical Gate Charge Characteristics



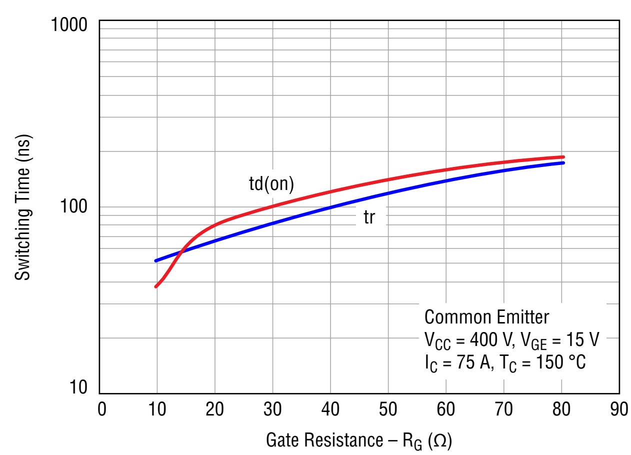
Typical Forward Characteristics



Typical Turn-on Characteristics vs Gate Resistance @ T_C = 25 °C



Typical Turn-on Characteristics vs Gate Resistance @ T_C = 150 °C



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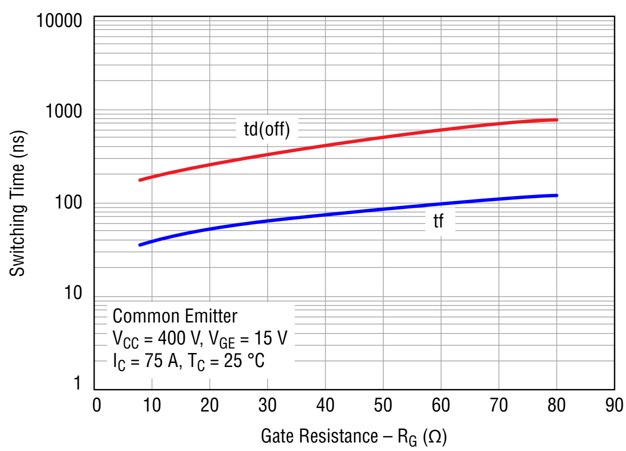
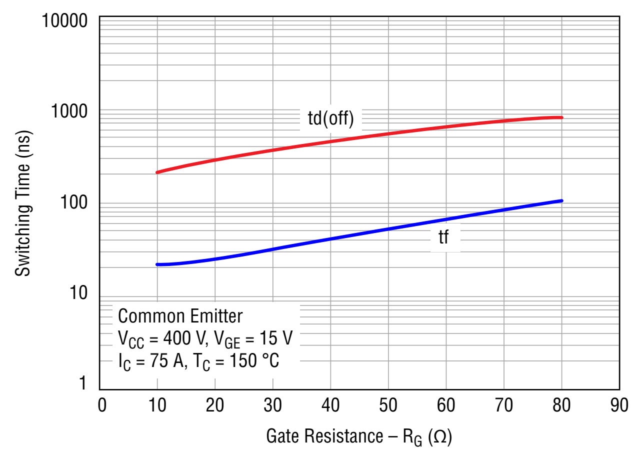
Electrical Characteristic Performance (continued)

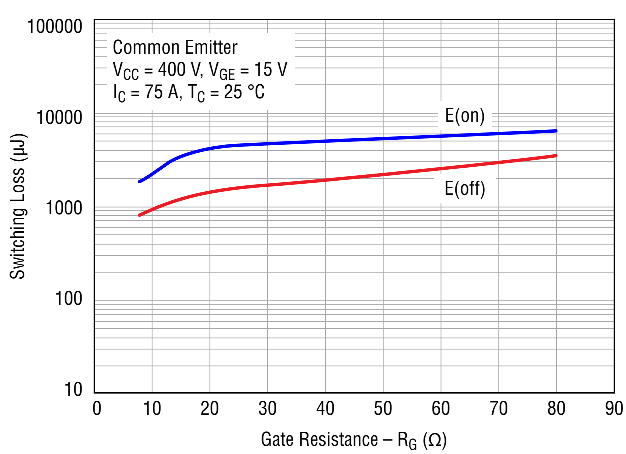
Typical Turn-off Characteristics vs Gate Resistance @ T_C = 25 °C



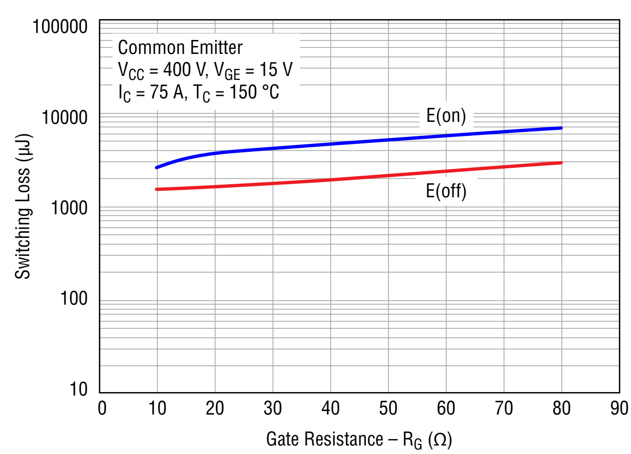
Typical Turn-off Characteristics vs Gate Resistance @ T_C = 150 °C



Typical Switching Loss vs Gate Resistance @ T_C = 25 °C



Typical Switching Loss vs Gate Resistance @ T_C = 150 °C



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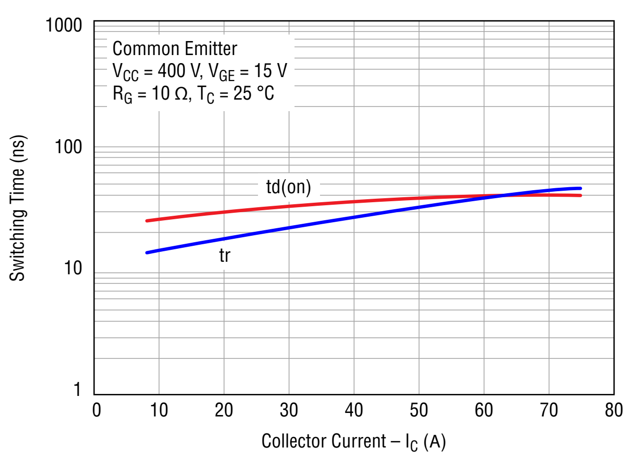
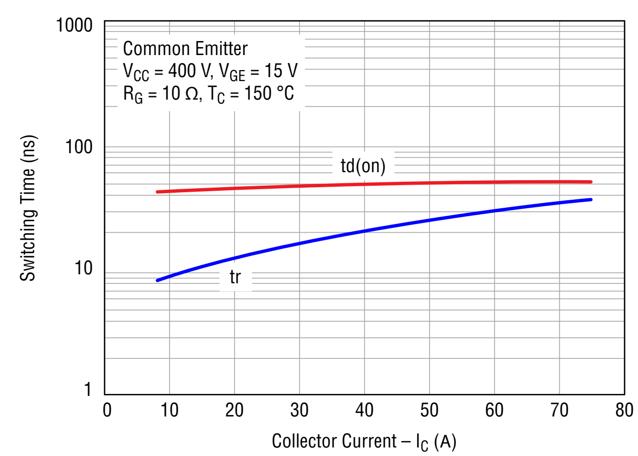
Electrical Characteristic Performance (continued)

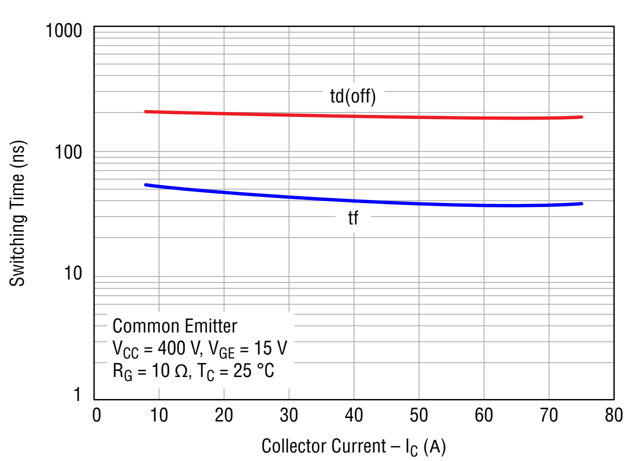
Typical Turn-on Characteristics vs Collector Current @ T_C = 25 °C



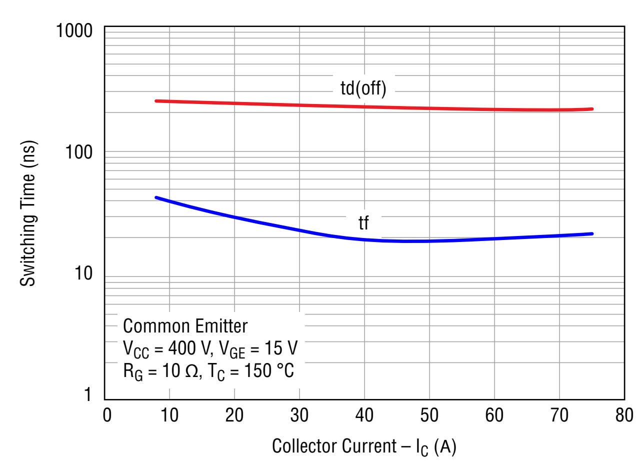
Typical Turn-on Characteristics vs Collector Current @ T_C = 150 °C



Typical Turn-off Characteristics vs Collector Current @ T_C = 25 °C



Typical Turn-off Characteristics vs Collector Current @ T_C = 150 °C



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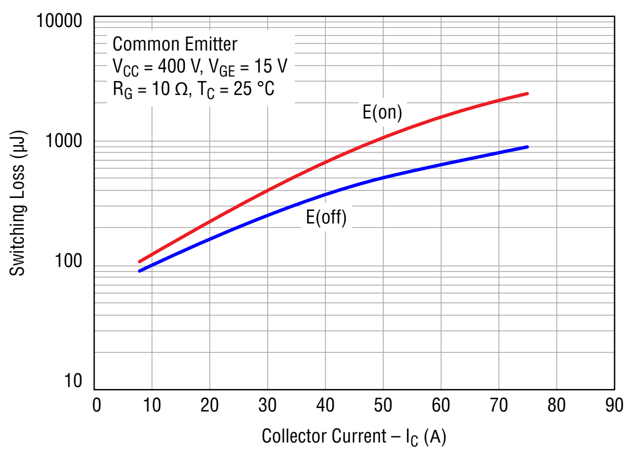
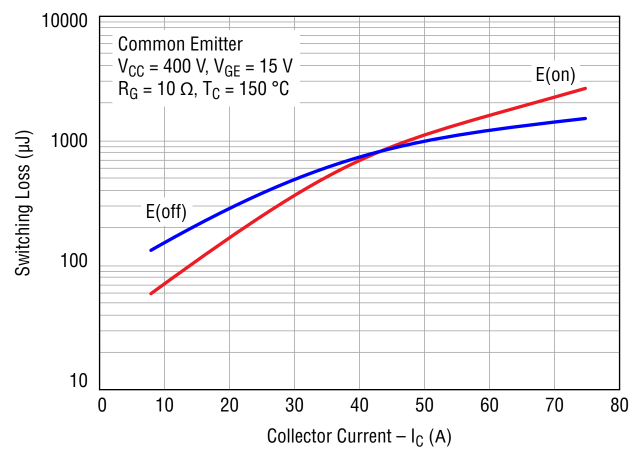
Electrical Characteristic Performance (continued)

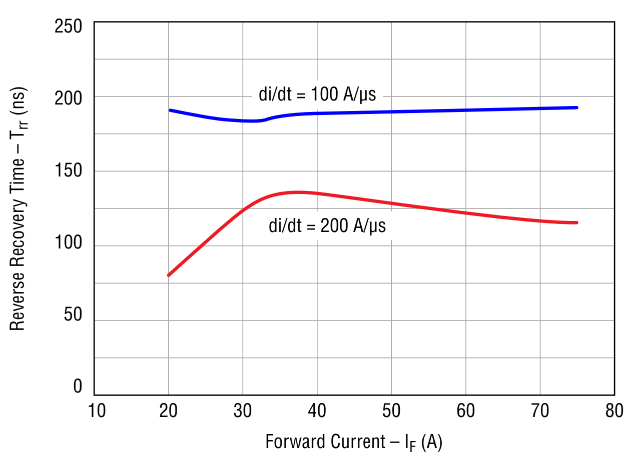
Typical Switching Loss vs Collector Current @ T_C = 25 °C



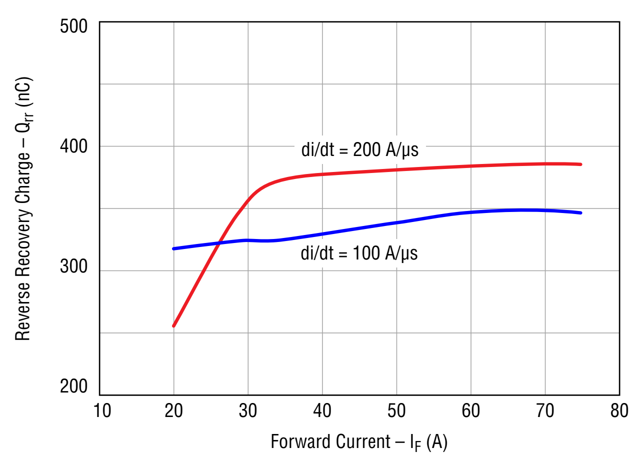
Typical Switching Loss vs Collector Current @ T_C = 150 °C



Typical Reverse Recovery Time vs Forward Current



Typical Reverse Recovery Charge vs Forward Current



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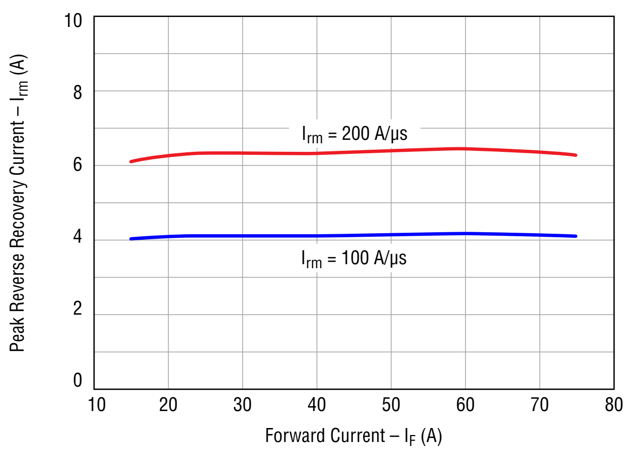
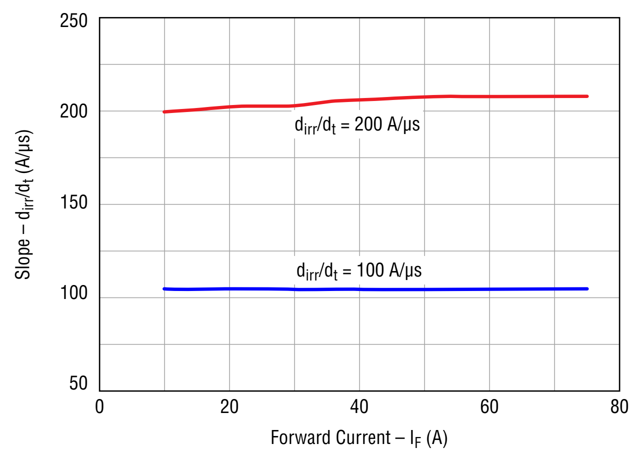
Electrical Characteristic Performance (continued)

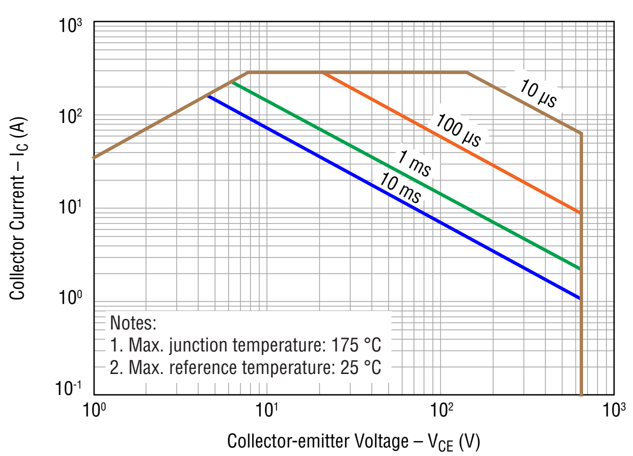
Typical Peak Reverse Recovery Current vs Forward Current



Typical Slope vs Forward Current



Maximum Safe Operating Area



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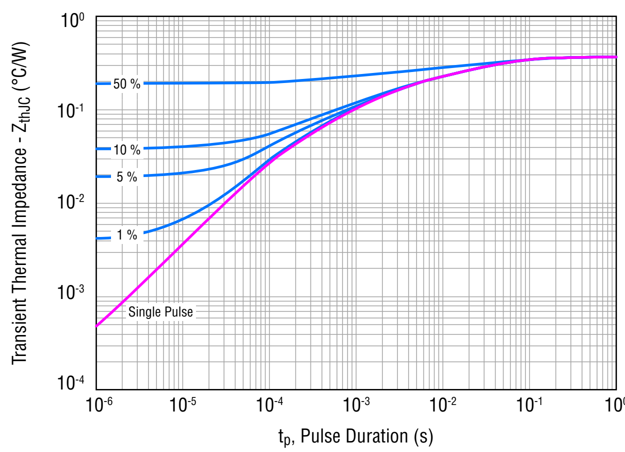
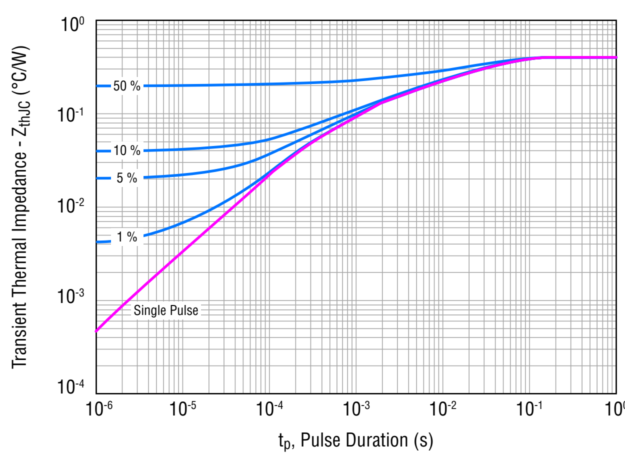
Electrical Characteristic Performance (continued)

IGBT Transient Thermal Impedance vs $t_{p(on)}$ Duration (D=t_p/T)



Diode Transient Thermal Impedance vs $t_{p(on)}$ Duration (D=t_p/T)



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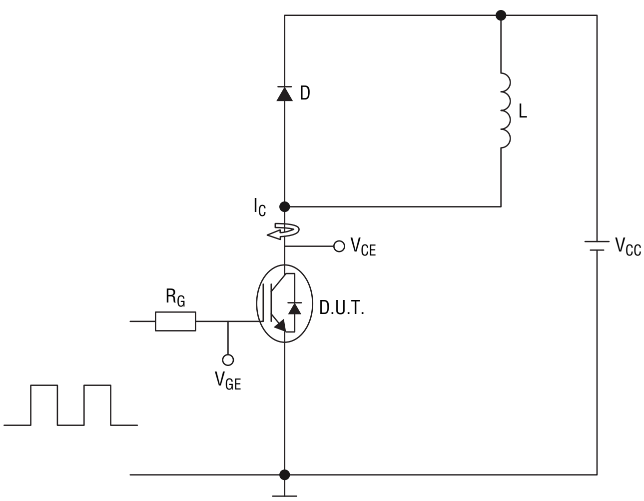
Inductive Load Test Circuit



L = 100 μH, V_{CE} = 400 V, V_{GE} = 15 V, I_C = 75 A, R_G = 10 Ω

How to Order

B I D W 75 N 65 EH5

- B = Bourns®
- I = IGBT
- Type
  - D = Discrete
- Package Code
  - W = TO-247-3L
- Current Rating
  - 75 = 75 A
- Device Type
  - N = N-channel
- Nominal Voltage (divided by 10)
  - 65 = 650 V
- Optimization
  - EH = Extremely High Speed
- Version Number
  - 5 = Revision Control

Environmental Characteristics

ESD Class (HBM)..2

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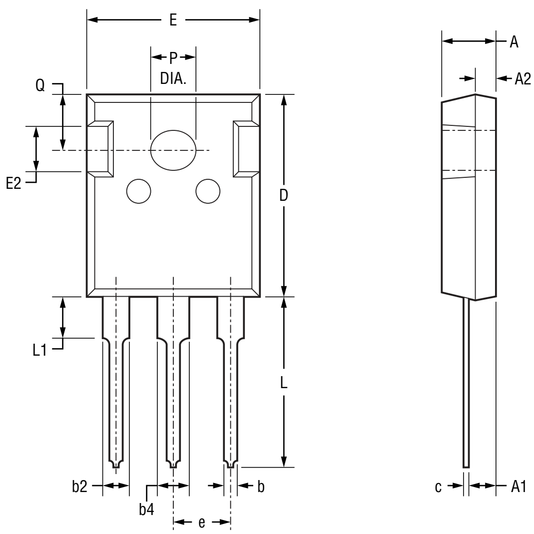
Product Dimensions



DIMENSIONS: MM (INCHES)

Symbol	Min.	Nom.	Max.
A	4.80 (.189)	5.00 (.197)	5.20 (.205)
A1	2.21 (.087)	2.41 (.095)	2.59 (.102)
A2	1.85 (.073)	2.00 (.079)	2.15 (.085)
b	1.11 (.044)	—	1.36 (.054)
b2	1.91 (.075)	—	2.25 (.089)
b4	2.91 (.115)	—	3.25 (.128)
c	0.51 (.020)	—	0.75 (.030)
D	20.80 (.819)	21.00 (.827)	21.30 (.839)
E	15.50 (.610)	15.80 (.622)	16.10 (.634)
E2	4.40 (.173)	5.00 (.197)	5.20 (.205)
e	5.44 (.214) BSC		
L	19.72 (.776)	19.92 (.784)	20.22 (.796)
L1	—	—	4.30 (.169)
P	3.40 (.134)	—	3.80 (.150)
Q	5.60 (.220)	5.80 (.228)	6.00 (.236)

Packaging Specifications

BIDW75N65EH5..30 pieces per tube

BOURNS®

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Email: asiacus@bourns.com

EMEA: Tel: +36 88 885 877
Email: eurocus@bourns.com

The Americas: Tel: +1-951 781-5500
Email: americus@bourns.com

www.bourns.com

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The characteristics and parameters of a Bourns® product set forth in its data sheet are based on laboratory conditions, and statements regarding the suitability of products for certain "typical" applications are based on Bourns' knowledge of typical requirements in generic applications. Bourns assumes that "typical" applications include failsafe/backup features to address critical risks to users and are designed to allow rework of Bourns® product to avoid scrap of a device solely due to malfunctioning Bourns® product. The characteristics and parameters of a Bourns® product in a user application may vary from the data sheet characteristics and parameters due to (i) the combination of the Bourns® product with other components in the user's application, or (ii) the environment of the user application itself. The characteristics and parameters of a Bourns® product also can and do vary in different applications and actual performance may vary over time. Thus, users should always verify the actual performance of the Bourns® product in their specific devices and applications and make their own independent judgments regarding the suitability of Bourns® product and the amount of additional test margin to design into their device or application to compensate for differences between laboratory and real-world conditions.

Unless Bourns has explicitly designated an individual Bourns® product as meeting the requirements of a particular industry standard (e.g., IATF 16949) or a particular qualification (e.g., UL listed or recognized), Bourns is not responsible for any failure of an individual Bourns® product to meet the requirements of such industry standard or particular qualification even if such industry standard or qualification is a "state of art". Users of Bourns® products are responsible for ensuring compliance with safety-related requirements and standards applicable to their devices or applications.

Bourns® products are not recommended, authorized or intended for use in applications where failure or malfunction may result in personal injury, death, or severe property or environmental damage, such as without limitation nuclear, life-critical medical and certain automotive and aviation applications. Except as set forth in the bullet points below or unless expressly and specifically approved in writing on a case-by-case basis by an authorized Bourns' representative, use of any Bourns® products in such unauthorized high-risk applications is at the user's sole risk.

- Bourns considers implantable/invasive devices and devices/procedures designed as life-supporting or life-sustaining by the U.S. Food and Drug Administration or equivalent organizations outside of the United States as "life-critical" medical applications. Bourns expressly identifies those Bourns® standard products that are suitable for use in typical medical applications that are not life-critical in its publication entitled "Bourns Medical Grade Component Guide."

- Bourns expressly identifies those Bourns® standard products that are suitable for use in typical automotive applications associated with any Automate Safety Integrity Level (ASIL) in its publication entitled "Bourns Automotive Grade Component Guide." Bourns' designation of Bourns® product as compliant with the AEC-Q standard does not by itself mean that Bourns has approved such product for use in an automotive application.

- Bourns expressly identifies Bourns® standard products that are suitable for use in the typical aviation applications/systems requiring System Design Assurance Level (RTCA DO-254 DAL) of C, D or E in its publication entitled "Bourns Civilian Aerospace/Aviation Grade Component Guide." Bourns does not test its products for compliance with United States Federal Aviation Administration standards or any other generally equivalent governmental organization standard applicable to products designed or manufactured for use in aviation applications. Use of Bourns® standard components in aviation applications associated with RTCA DO-254 DAL A or B without proper approval noted above shall be at the user's sole risk.

- Bourns will review and authorize on a case-by-case basis the use of Bourns® standard products which are at least AEC-Q compliant in space-related civil applications (rockets, satellites) with a negotiated cross-waiver and indemnity agreement.

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