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!

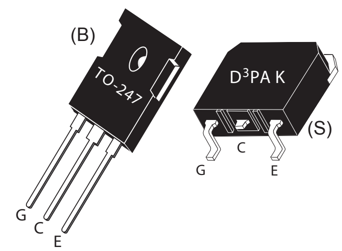
Contact us

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

650V, 45A, $V_{CE(on)}$= 1.9V Typical

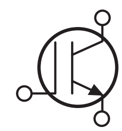
Ultra Fast NPT - IGBT®

The Ultra Fast 650V NPT-IGBT® family of products is the newest generation of IGBTs optimized for outstanding ruggedness and best trade-off between conduction and switching losses.



Features

- **Low Saturation Voltage**
- **Low Tail Current**
- **RoHS Compliant**
- **Short Circuit Withstand Rated**
- **High Frequency Switching**
- **Ultra Low Leakage Current**



Unless stated otherwise, Microsemi discrete IGBTs contain a single IGBT die. This device is recommended for applications such as induction heating (IH), motor control, general purpose inverters and uninterruptible power supplies (UPS).

MAXIMUM RATINGS

All Ratings: T_C = 25°C unless otherwise specified.

Symbol	Parameter	Ratings	Unit
V_{ces}	Collector Emitter Voltage	650	V
V_{GE}	Gate-Emitter Voltage	±30	
I_{C1}	Continuous Collector Current @ T_C = 25°C	118	A
I_{C2}	Continuous Collector Current @ T_C = 110°C	56	
I_{CM}	Pulsed Collector Current ①	224	
SCWT	Short Circuit Withstand Time: V_{CE} = 325V, V_{GE} = 15V, T_C=125°C	10	µs
P_D	Total Power Dissipation @ T_C = 25°C	543	W
T_J,T_{STG}	Operating and Storage Junction Temperature Range	-55 to 150	°C
T_L	Max. Lead Temp. for Soldering: 0.063" from Case for 10 Sec.	300	

STATIC ELECTRICAL CHARACTERISTICS

Symbol	Parameter	Min	Typ	Max	Unit
$V_{(BR)CES}$	Collector-Emitter Breakdown Voltage (V_{GE} = 0V, I_C = 250uA)	650			Volts
$V_{GE(TH)}$	Gate Threshold Voltage (V_{CE} = V_{GE}, I_C = 1.0mA, T_j = 25°C)	3.5	5.0	6.5	
$V_{CE(ON)}$	Collector-Emitter On Voltage (V_{GE} = 15V, I_C = 45A, T_j = 25°C)		1.9	2.4	
	Collector-Emitter On Voltage (V_{GE} = 15V, I_C = 45A, T_j = 125°C)		2.4		
	Collector-Emitter On Voltage (V_{GE} = 15V, I_C = 90A, T_j = 25°C)		2.6		
I_{CES}	Collector Cut-off Current (V_{CE} = 650V, V_{GE} = 0V, T_j = 25°C) ②		10	250	µA
	Collector Cut-off Current (V_{CE} = 650V, V_{GE} = 0V, T_j = 125°C) ②		100		
I_{GES}	Gate-Emitter Leakage Current (V_{GE} = ±20V)			±250	nA

CAUTION: These Devices are Sensitive to Electrostatic Discharge. Proper Handling Procedures Should Be Followed.

052-6414 Rev B 5-2014

DYNAMIC CHARACTERISTICS

Symbol	Parameter	Test Conditions	Min	Typ	Max	Unit
C_{ies}	Input Capacitance	Capacitance		2900		pF
C_{oes}	Output Capacitance	V_{GE} = 0V, V_{CE} = 25V		548		
C_{res}	Reverse Transfer Capacitance	f = 1MHz		268		
V_{GEP}	Gate to Emitter Plateau Voltage	Gate Charge		7.5		V
Q_g (3)	Total Gate Charge	V_{GE} = 15V		150	203	nC
Q_{ge}	Gate-Emitter Charge	V_{CE}= 325V		18	24	
Q_{gc}	Gate- Collector Charge	I_C = 45A		74	100	
$t_{d(on)}$	Turn-On Delay Time	Inductive Switching (25°C)		15		ns
t_r	Current Rise Time	V_{CC} = 433V		32		
$t_{d(off)}$	Turn-Off Delay Time	V_{GE} = 15V		100		
t_f	Current Fall Time	I_C = 45A		50		
E_{on2} (5)	Turn-On Switching Energy	R_G = 4.3Ω (4)		900	1350	μJ
E_{off} (6)	Turn-Off Switching Energy	T_J = +25°C		580	870	
$t_{d(on)}$	Turn-On Delay Time	Inductive Switching (125°C)		15		ns
t_r	Current Rise Time	V_{CC} = 433V		32		
$t_{d(off)}$	Turn-Off Delay Time	V_{GE} = 15V		123		
t_f	Current Fall Time	I_C = 45A		52		
E_{on2} (5)	Turn-On Switching Energy	R_G = 4.3Ω (4)		925	1245	μJ
E_{off} (6)	Turn-Off Switching Energy	T_J = +125°C		800	1160	

THERMAL AND MECHANICAL CHARACTERISTICS

Symbol	Characteristic	Min	Typ	Max	Unit
$R_{\theta JC}$	Junction to Case Thermal Resistance			0.23	°C/W
$R_{\theta JA}$	Junction to Ambient Thermal Resistance			40	
W_T	Package Weight		0.22		oz
			6.2		g
Torque	Mounting Torque (TO-247 Package), 4-40 or M3 screw			10	in-lbf
				6.2	N·m

1 Repetitive Rating: Pulse width and case temperature limited by maximum junction temperature.
2 Pulse test: Pulse Width < 380μs, duty cycle < 2%.
3 See Mil-Std-750 Method 3471.
4 R_G is external gate resistance, not including internal gate resistance or gate driver impedance. (MIC4452)
5 E_{on2} is the energy loss at turn-on and includes the charge stored in the freewheeling diode.
6 E_{off} is the clamped inductive turn-off energy measured in accordance with JEDEC standard JESD24-1.

Microsemi reserves the right to change, without notice, the specifications and information contained herein.

TYPICAL PERFORMANCE CURVES

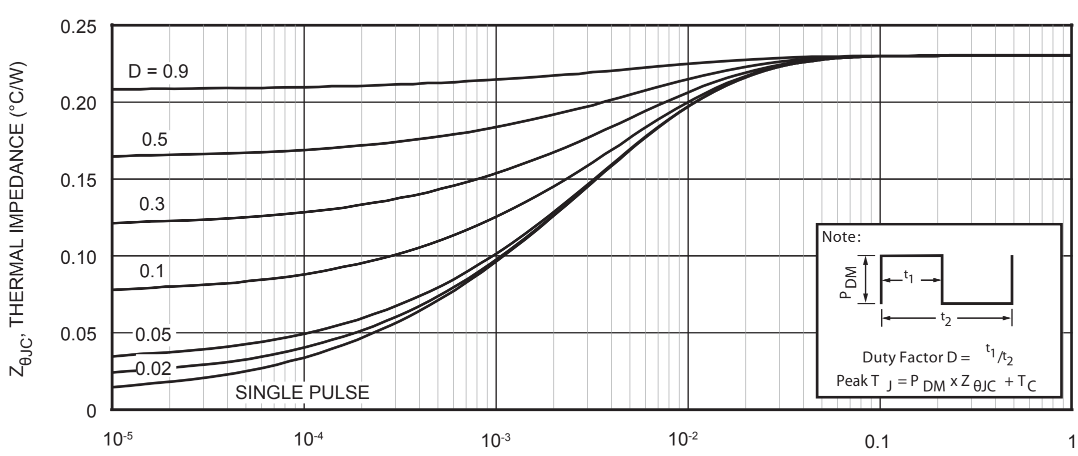


FIGURE 1. Maximum Effective Transient Thermal Impedance, Junction-To-Case vs Pulse Duration

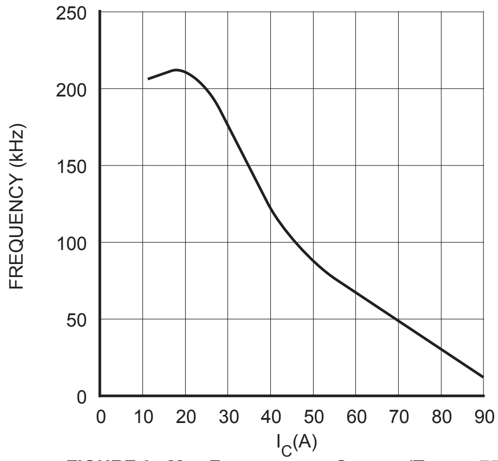


FIGURE 2. Max Frequency vs Current (T_{case} = 75°C)

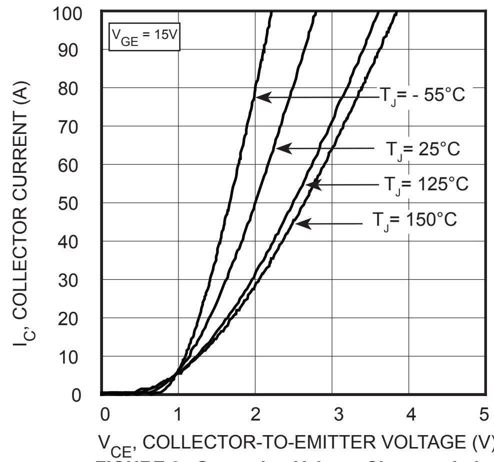


FIGURE 3. Saturation Voltage Characteristics

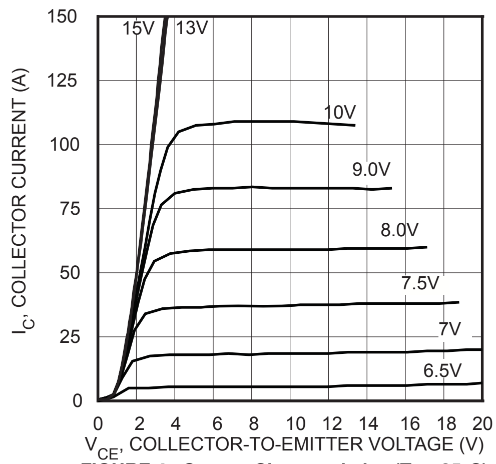


FIGURE 4. Output Characteristics (T_J = 25°C)

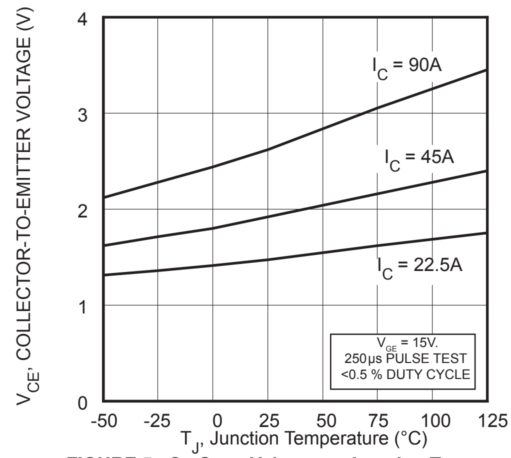


FIGURE 5. On State Voltage vs Junction Temperature

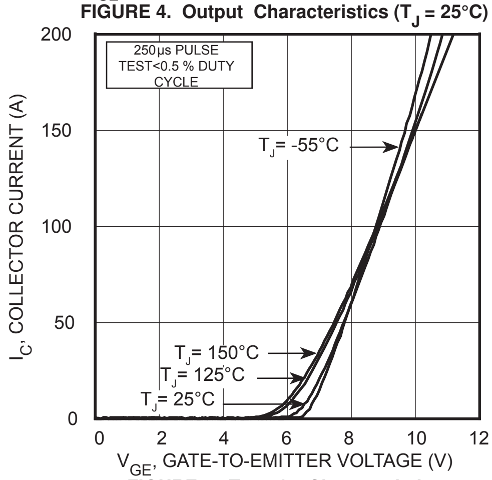


FIGURE 6, Transfer Characteristics

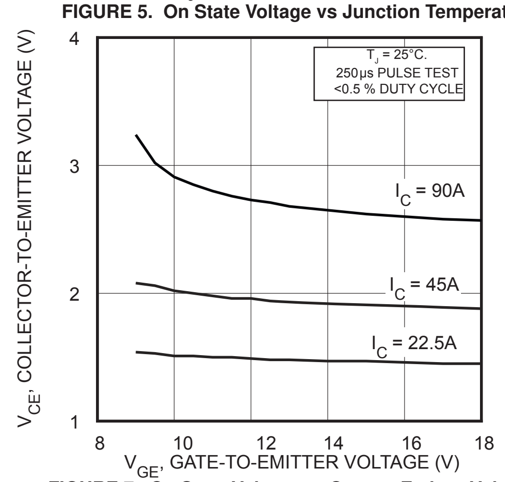


FIGURE 7, On State Voltage vs Gate-to-Emitter Voltage

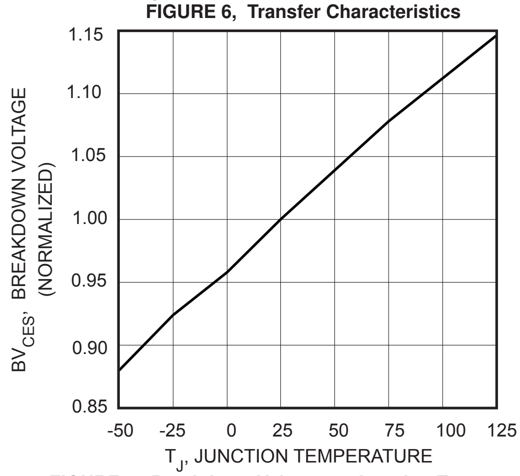


FIGURE 8. Breakdown Voltage vs Junction Temperature

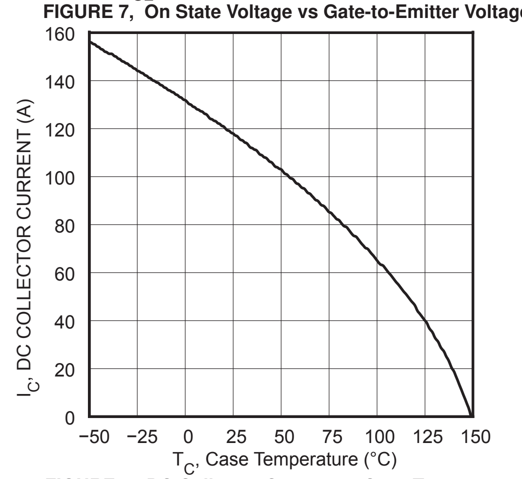


FIGURE 9. DC Collector Current vs Case Temperature

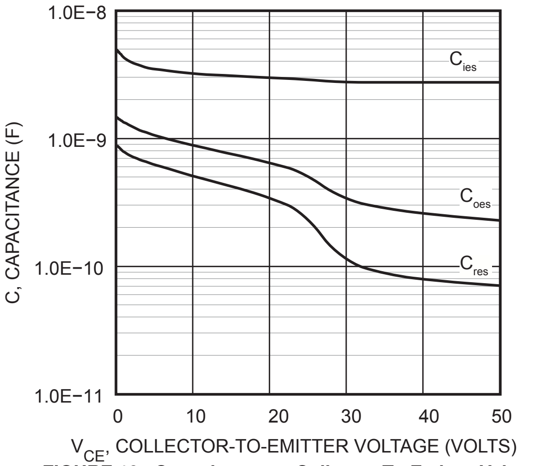


FIGURE 10. Capacitance vs Collector-To-Emitter Voltage

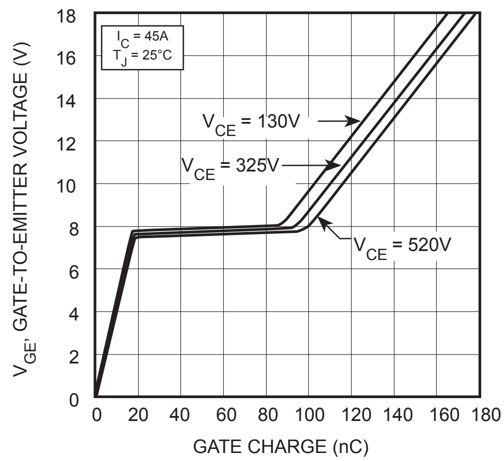


FIGURE 11. Gate Charge

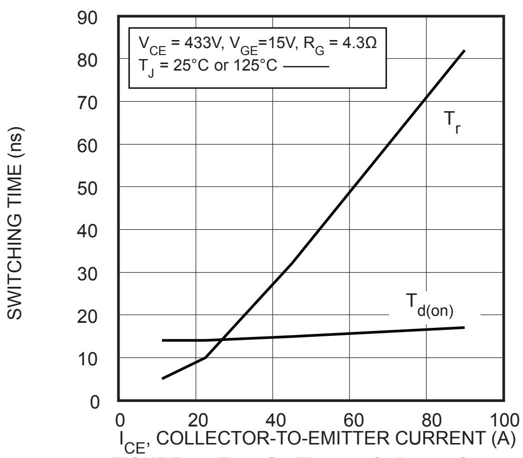


FIGURE 12. Turn-On Time vs Collector Current

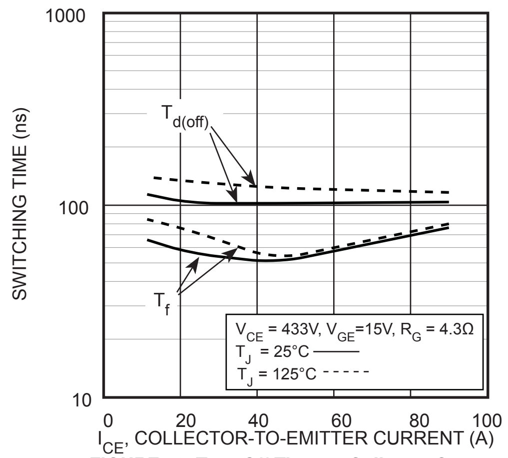


FIGURE 13. Turn-Off Time vs Collector Current

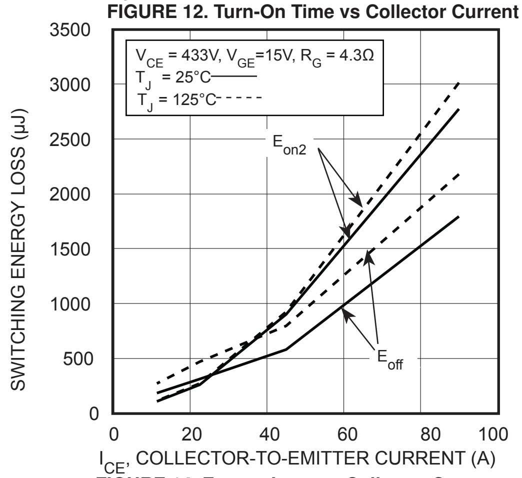


FIGURE 14. Energy Loss vs Collector Current

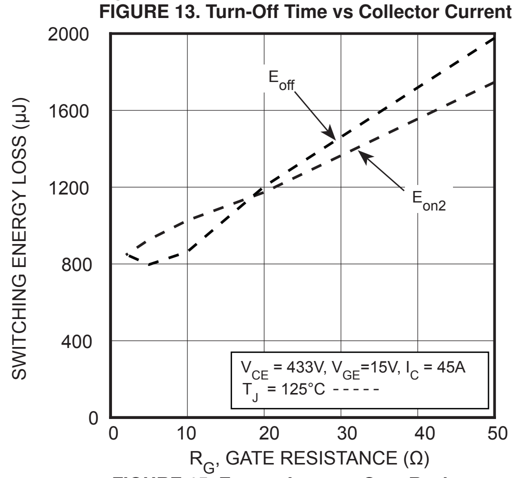


FIGURE 15. Energy Loss vs Gate Resistance

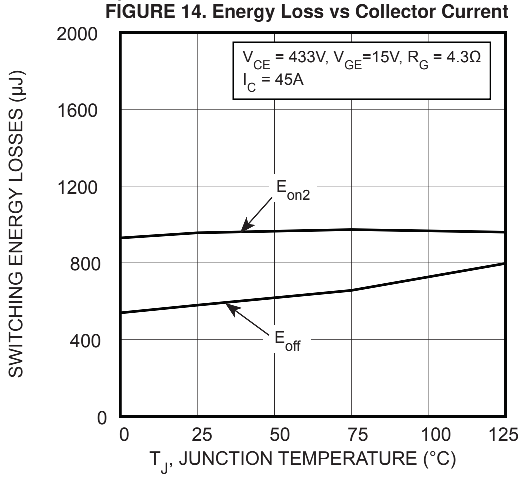


FIGURE 16. Swiitching Energy vs Junction Temperature

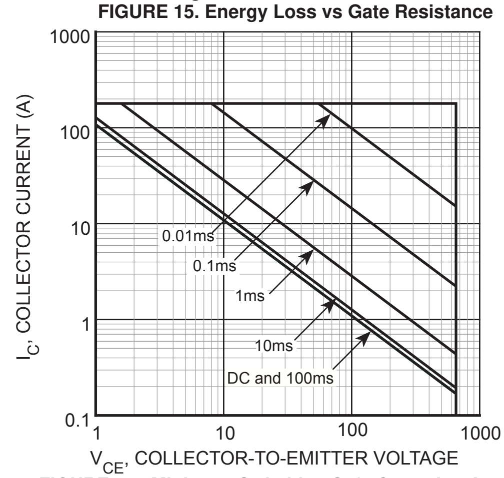
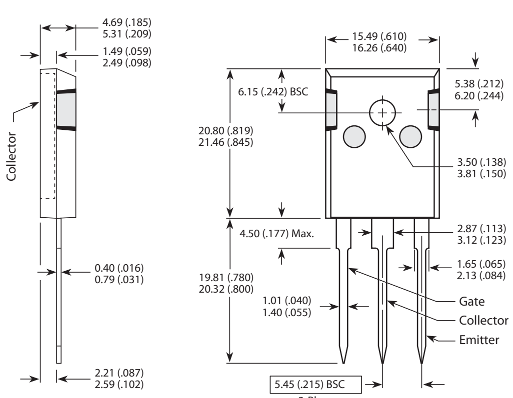


FIGURE 17. Minimum Switching Safe Operating Area

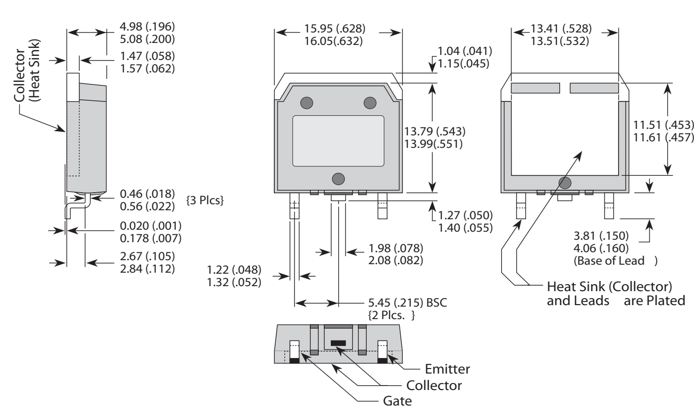
TO-247 Package Outline



Dimensions in Millimeters and (Inches)

D³PAK Package Outline

e3 : 100% Sn Plating



Dimensions in Millimeters (Inches)

Disclaimer:

052-6414 Rev B 5-2014