



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!



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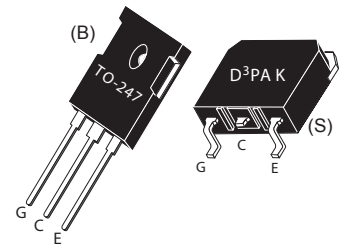


Ultra Fast NPT - IGBT®

The Ultra Fast NPT - IGBT® is a new generation of high voltage power IGBTs. Using Non-Punch-Through Technology, the Ultra Fast NPT-IGBT® offers superior ruggedness and ultrafast switching speed.

Features

- Low Saturation Voltage
- Low Tail Current
- RoHS Compliant 
- Short Circuit Withstand Rated
- High Frequency Switching to 50KHz
- 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: $T_C = 25^\circ C$ unless otherwise specified.

Symbol	Parameter	Rated	Unit
V_{CES}	Collector Emitter Voltage	1200	V
V_{GE}	Gate-Emitter Voltage	± 30	
I_{C1}	Continuous Collector Current @ $T_C = 25^\circ C$	88	A
I_{C2}	Continuous Collector Current @ $T_C = 100^\circ C$	40	
I_{CM}	Pulsed Collector Current ^①	160	
SCWT	Short Circuit Withstand Time: $V_{CE} = 600V, V_{GE} = 15V, T_C = 125^\circ C$	10	μs
P_D	Total Power Dissipation @ $T_C = 25^\circ C$	500	W
T_J, T_{STG}	Operating and Storage Junction Temperature Range	-55 to 150	$^\circ C$
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 ($V_{GE} = 0V, I_C = 1.0mA$)	1200			Volts
$V_{GE(TH)}$	Gate Threshold Voltage ($V_{CE} = V_{GE}, I_C = 2.0mA, T_J = 25^\circ C$)	3	4.5	6.0	
$V_{CE(ON)}$	Collector-Emitter On Voltage ($V_{GE} = 15V, I_C = 40A, T_J = 25^\circ C$)		2.5	3.2	
	Collector-Emitter On Voltage ($V_{GE} = 15V, I_C = 40A, T_J = 125^\circ C$)		3.5		
	Collector-Emitter On Voltage ($V_{GE} = 15V, I_C = 88A, T_J = 25^\circ C$)		3.2		
I_{CES}	Collector Cut-off Current ($V_{CE} = 1200V, V_{GE} = 0V, T_J = 25^\circ C$) ^②		10	1000	μA
	Collector Cut-off Current ($V_{CE} = 1200V, V_{GE} = 0V, T_J = 125^\circ C$) ^②		100		
I_{GES}	Gate-Emitter Leakage Current ($V_{GE} = \pm 20V$)			± 250	nA



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

DYNAMIC CHARACTERISTICS

APT40GR120B_S

Symbol	Parameter	Test Conditions	Min	Typ	Max	Unit
C_{ies}	Input Capacitance	Capacitance $V_{GE} = 0V, V_{CE} = 25V$ $f = 1MHz$		3980		pF
C_{oes}	Output Capacitance			320		
C_{res}	Reverse Transfer Capacitance			80		
V_{GEP}	Gate to Emitter Plateau Voltage	Gate Charge $V_{GE} = 15V$ $V_{CE} = 600V$ $I_C = 40A$		7		V
$Q_g^{(3)}$	Total Gate Charge			210		nC
Q_{ge}	Gate-Emitter Charge			25		
Q_{gc}	Gate- Collector Charge			90		
$t_{d(on)}$	Turn-On Delay Time	Inductive Switching (25°C) $V_{CC} = 600V$ $V_{GE} = 15V$ $I_C = 40A$		22		ns
t_r	Current Rise Time			25		
$t_{d(off)}$	Turn-Off Delay Time			163		
t_f	Current Fall Time			40		
$E_{on2}^{(5)}$	Turn-On Switching Energy	$R_G = 4.3 \Omega^{(4)}$ $T_J = +25^\circ C$		1375	3000	μJ
$E_{off}^{(6)}$	Turn-Off Switching Energy			906	1650	
$t_{d(on)}$	Turn-On Delay Time	Inductive Switching (125°C) $V_{CC} = 600V$ $V_{GE} = 15V$ $I_C = 40A$		22		ns
t_r	Current Rise Time			25		
$t_{d(off)}$	Turn-Off Delay Time			185		
t_f	Current Fall Time			47		
$E_{on2}^{(5)}$	Turn-On Switching Energy	$R_G = 4.3 \Omega^{(4)}$ $T_J = +125^\circ C$		1916	3500	μJ
$E_{off}^{(6)}$	Turn-Off Switching Energy			1186	2500	

THERMAL AND MECHANICAL CHARACTERISTICS

Symbol	Characteristic	Min	Typ	Max	Unit
$R_{\theta JC}$	Junction to Case Thermal Resistance			.25	$^\circ C/W$
$R_{\theta JA}$	Junction to Ambient Thermal Resistance			40	
W_T	Package Weight		.22 6.2		oz g
Torque	Mounting Torque (TO-247 Package), 4-40 or M3 screw			10 6.2	in-lbf N-m

1 Repetitive Rating: Pulse width and case temperature limited by maximum junction temperature.

2 Pulse test: Pulse Width < 380 μs , 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 clamped inductive turn on energy that includes a commutating diode reverse recovery current in the IGBT turn on energy loss. A combi device is used for the clamping 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

APT40GR120B_S

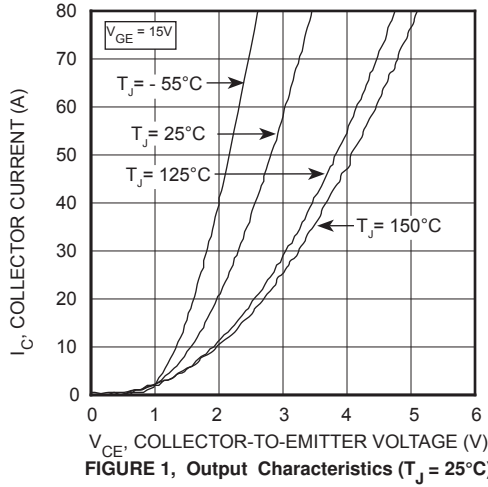


FIGURE 1, Output Characteristics ($T_J = 25^\circ\text{C}$)

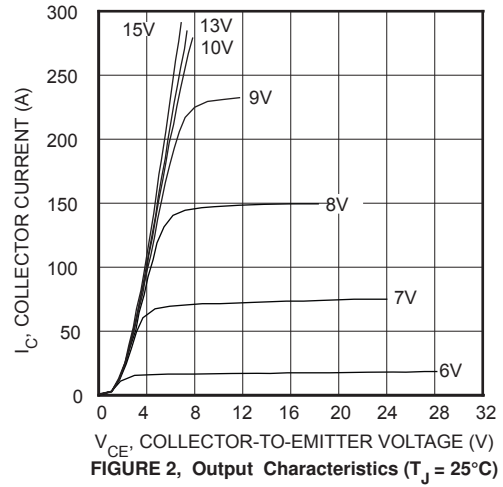


FIGURE 2, Output Characteristics ($T_J = 25^\circ\text{C}$)

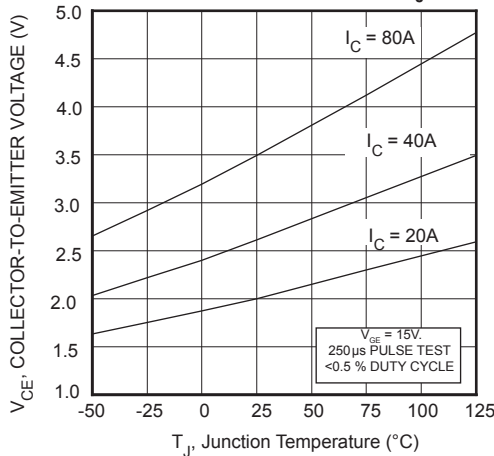


FIGURE 3, On State Voltage vs Junction Temperature

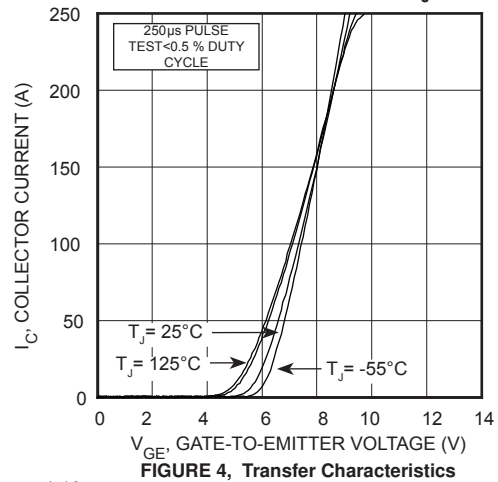


FIGURE 4, Transfer Characteristics

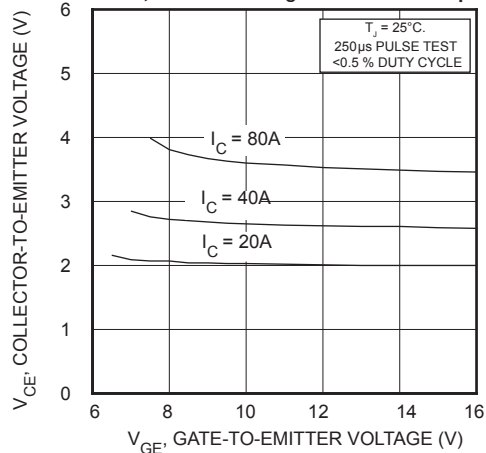


FIGURE 5, On State Voltage vs Gate-to-Emitter Voltage

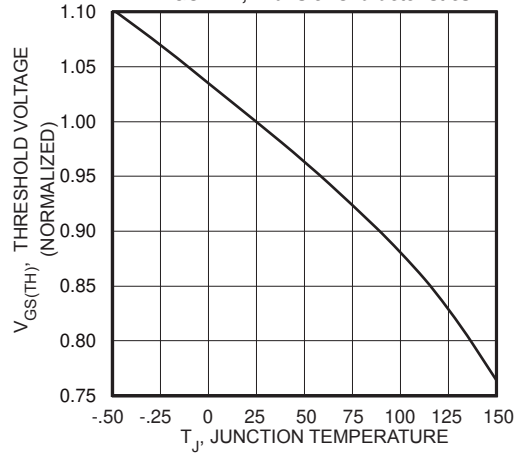


FIGURE 6, Threshold Voltage vs Junction Temperature

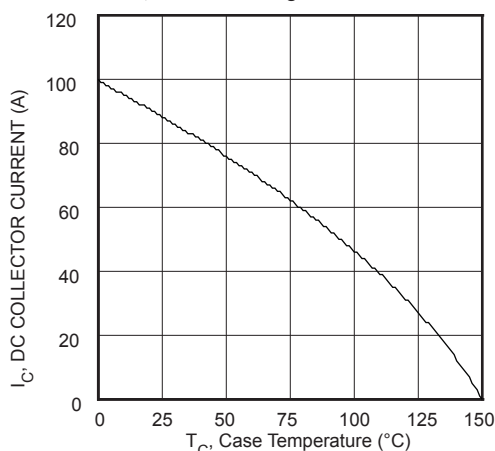


FIGURE 7, DC Collector Current vs Case Temperature

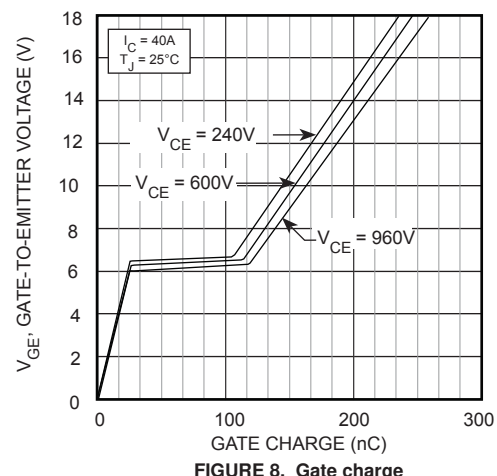


FIGURE 8, Gate charge

TYPICAL PERFORMANCE CURVES

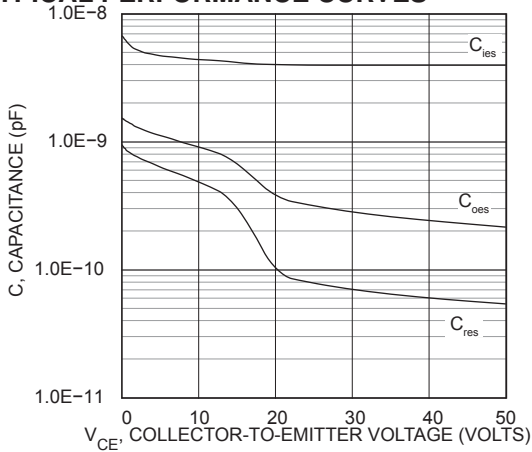


FIGURE 9, Capacitance vs Collector-To-Emitter Voltage

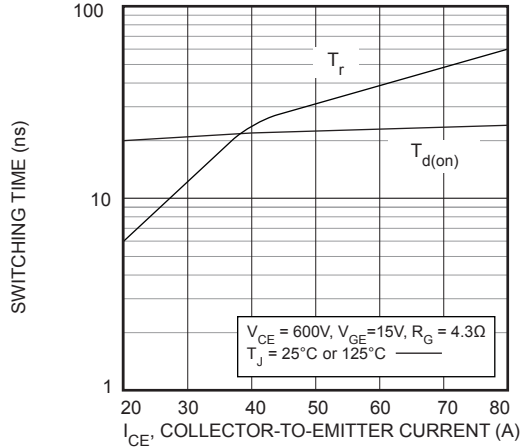


FIGURE 11, Turn-On Time vs Collector Current

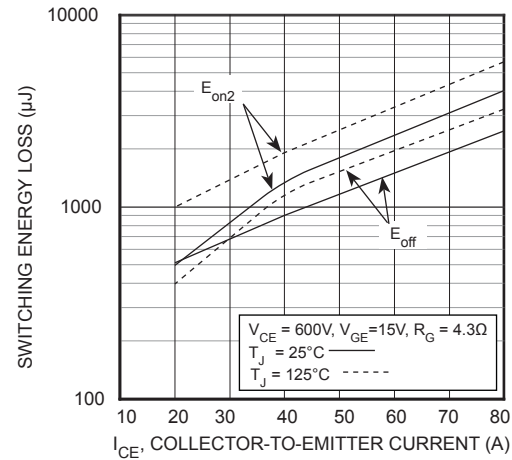


FIGURE 13, Energy Loss vs Collector Current

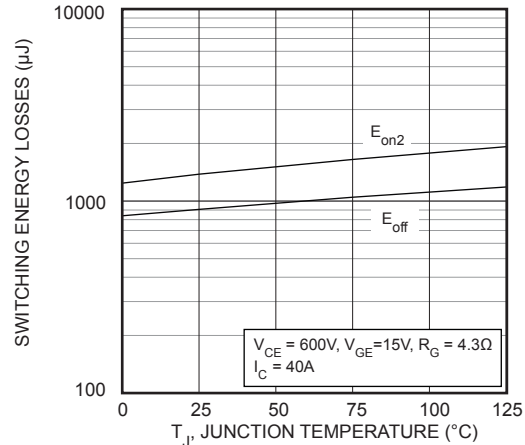


FIGURE 15, Energy Losses vs Junction Temperature

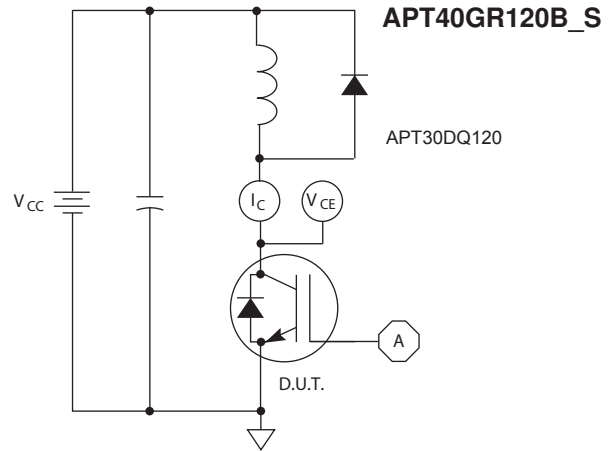


FIGURE 10, Inductive Switching Test Circuit

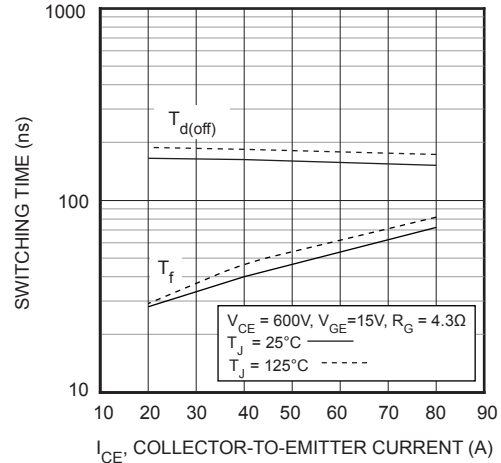


FIGURE 12, Turn-Off Time vs Collector Current

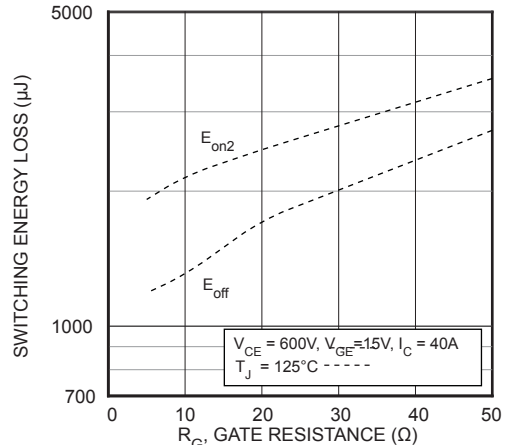


FIGURE 14, Energy Loss vs Gate Resistance

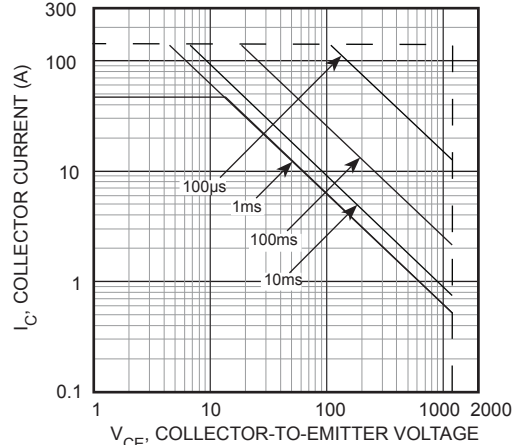


FIGURE 16, Minimum Switching Safe Operating Area

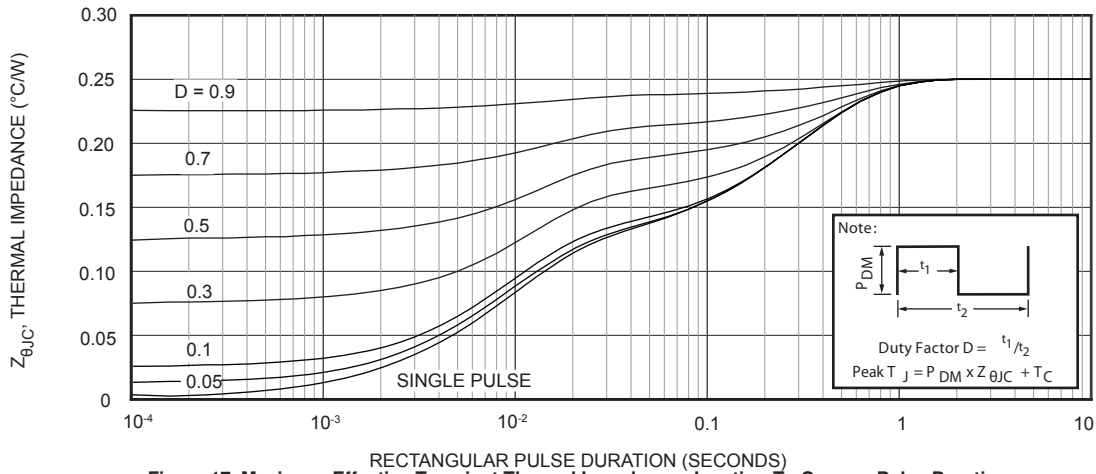
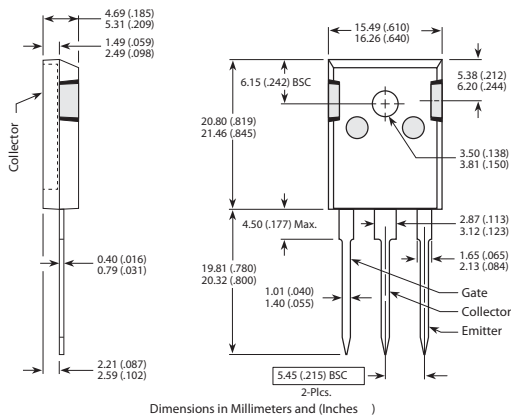


Figure 17, Maximum Effective Transient Thermal Impedance, Junction-To-Case vs Pulse Duration

TO-247 Package Outline

e3 SAC: 100% Sn Plating



D³PAK Package Outline

e3 SAC: 100% Sn Plating

