

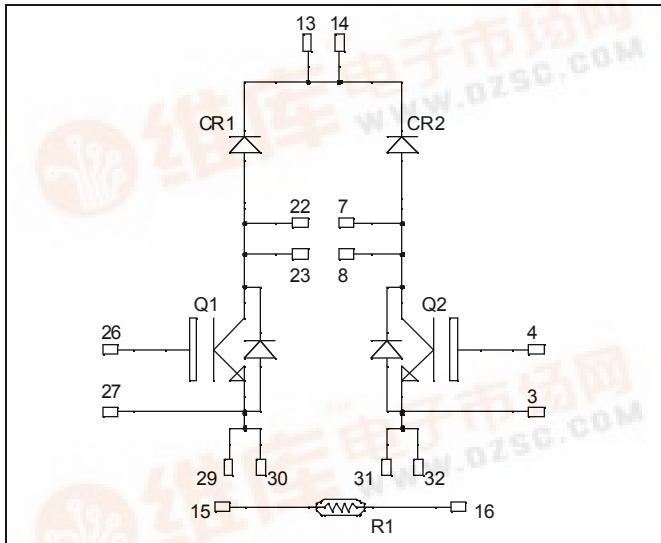


APTGF25DDA120T3G

Dual Boost Chopper NPT IGBT Power Module

$$V_{CES} = 1200V$$

$$I_C = 25A @ T_c = 80^{\circ}C$$



Application

- AC and DC motor control
- Switched Mode Power Supplies
- Power Factor Correction

Features

- Non Punch Through (NPT) Fast IGBT®
 - Low voltage drop
 - Low tail current
 - Switching frequency up to 50 kHz
 - Soft recovery parallel diodes
 - Low diode VF
 - Low leakage current
 - Avalanche energy rated
 - RBSOA and SCSOA rated
 - Symmetrical design
- Kelvin emitter for easy drive
- Very low stray inductance
- High level of integration
- Internal thermistor for temperature monitoring



All multiple inputs and outputs must be shorted together
Example: 13/14 ; 29/30 ; 22/23 ...

Benefits

- Outstanding performance at high frequency operation
- Direct mounting to heatsink (isolated package)
- Low junction to case thermal resistance
- Solderable terminals both for power and signal for easy PCB mounting
- Low profile
- Easy paralleling due to positive TC of VCEsat
- Each leg can be easily paralleled to achieve a single boost of twice the current capability.
- RoHS compliant

Absolute maximum ratings

Symbol	Parameter	Max ratings	Unit
V_{CES}	Collector - Emitter Breakdown Voltage	1200	V
I_C	Continuous Collector Current	$T_C = 25^{\circ}C$ 40 $T_C = 80^{\circ}C$ 25	A
I_{CM}	Pulsed Collector Current	$T_C = 25^{\circ}C$ 100	
V_{GE}	Gate - Emitter Voltage	± 20	V
P_D	Maximum Power Dissipation	$T_C = 25^{\circ}C$ 208	W
RBSOA	Reverse Bias Safe Operating Area	$T_j = 125^{\circ}C$ 50A@1150V	

All ratings @ $T_j = 25^\circ\text{C}$ unless otherwise specified

Electrical Characteristics

Symbol	Characteristic	Test Conditions		Min	Typ	Max	Unit
I_{CES}	Zero Gate Voltage Collector Current	$V_{GE} = 0\text{V}$ $V_{CE} = 1200\text{V}$	$T_j = 25^\circ\text{C}$ $T_j = 125^\circ\text{C}$			250 500	μA
$V_{CE(sat)}$	Collector Emitter saturation Voltage	$V_{GE} = 15\text{V}$ $I_C = 25\text{A}$	$T_j = 25^\circ\text{C}$ $T_j = 125^\circ\text{C}$	2.5	3.2 4.0	3.7	V
$V_{GE(th)}$	Gate Threshold Voltage	$V_{GE} = V_{CE}, I_C = 1\text{mA}$		4		6	V
I_{GES}	Gate – Emitter Leakage Current	$V_{GE} = 20\text{V}, V_{CE} = 0\text{V}$				400	nA

Dynamic Characteristics

Symbol	Characteristic	Test Conditions		Min	Typ	Max	Unit
C_{ies}	Input Capacitance	$V_{GE} = 0\text{V}$			1650		pF
C_{oes}	Output Capacitance	$V_{CE} = 25\text{V}$			250		
C_{res}	Reverse Transfer Capacitance	$f = 1\text{MHz}$			110		
Q_g	Total gate Charge	$V_{GE} = 15\text{V}$			160		nC
Q_{ge}	Gate – Emitter Charge	$V_{Bus} = 300\text{V}$			10		
Q_{gc}	Gate – Collector Charge	$I_C = 25\text{A}$			70		
$T_{d(on)}$	Turn-on Delay Time	Inductive Switching (25°C)			60		ns
T_r	Rise Time	$V_{GE} = 15\text{V}$			50		
$T_{d(off)}$	Turn-off Delay Time	$V_{Bus} = 400\text{V}$			305		
T_f	Fall Time	$I_C = 25\text{A}$ $R_G = 22\Omega$			30		
$T_{d(on)}$	Turn-on Delay Time	Inductive Switching (125°C)			60		ns
T_r	Rise Time	$V_{GE} = 15\text{V}$			50		
$T_{d(off)}$	Turn-off Delay Time	$V_{Bus} = 400\text{V}$			346		
T_f	Fall Time	$I_C = 25\text{A}$ $R_G = 22\Omega$			40		
E_{on}	Turn-on Switching Energy	$V_{GE} = 15\text{V}$ $V_{Bus} = 400\text{V}$	$T_j = 125^\circ\text{C}$		3.5		mJ
E_{off}	Turn-off Switching Energy	$I_C = 25\text{A}$ $R_G = 22\Omega$	$T_j = 125^\circ\text{C}$		1.5		

Chopper diode ratings and characteristics

Symbol	Characteristic	Test Conditions		Min	Typ	Max	Unit
V_{RRM}	Maximum Peak Repetitive Reverse Voltage			1200			V
I_{RM}	Maximum Reverse Leakage Current	$V_R = 1200\text{V}$	$T_j = 25^\circ\text{C}$ $T_j = 125^\circ\text{C}$			250 500	μA
I_F	Forward Current		$T_c = 70^\circ\text{C}$		60		A
V_F	Diode Forward Voltage	$I_F = 60\text{A}$			2	2.5	V
		$I_F = 120\text{A}$			2.3		
		$I_F = 60\text{A}$	$T_j = 125^\circ\text{C}$		1.8		
t_{rr}	Reverse Recovery Time	$I_F = 60\text{A}$ $V_R = 800\text{V}$ $di/dt = 200\text{A}/\mu\text{s}$	$T_j = 25^\circ\text{C}$		400		ns
			$T_j = 125^\circ\text{C}$		470		
Q_{rr}	Reverse Recovery Charge		$T_j = 25^\circ\text{C}$ $T_j = 125^\circ\text{C}$		1.2 4		μC

Temperature sensor NTC (see application note APT0406 on www.microsemi.com for more information).

Symbol	Characteristic	Min	Typ	Max	Unit
R ₂₅	Resistance @ 25°C		50		kΩ
B _{25/85}	T ₂₅ = 298.15 K		3952		K

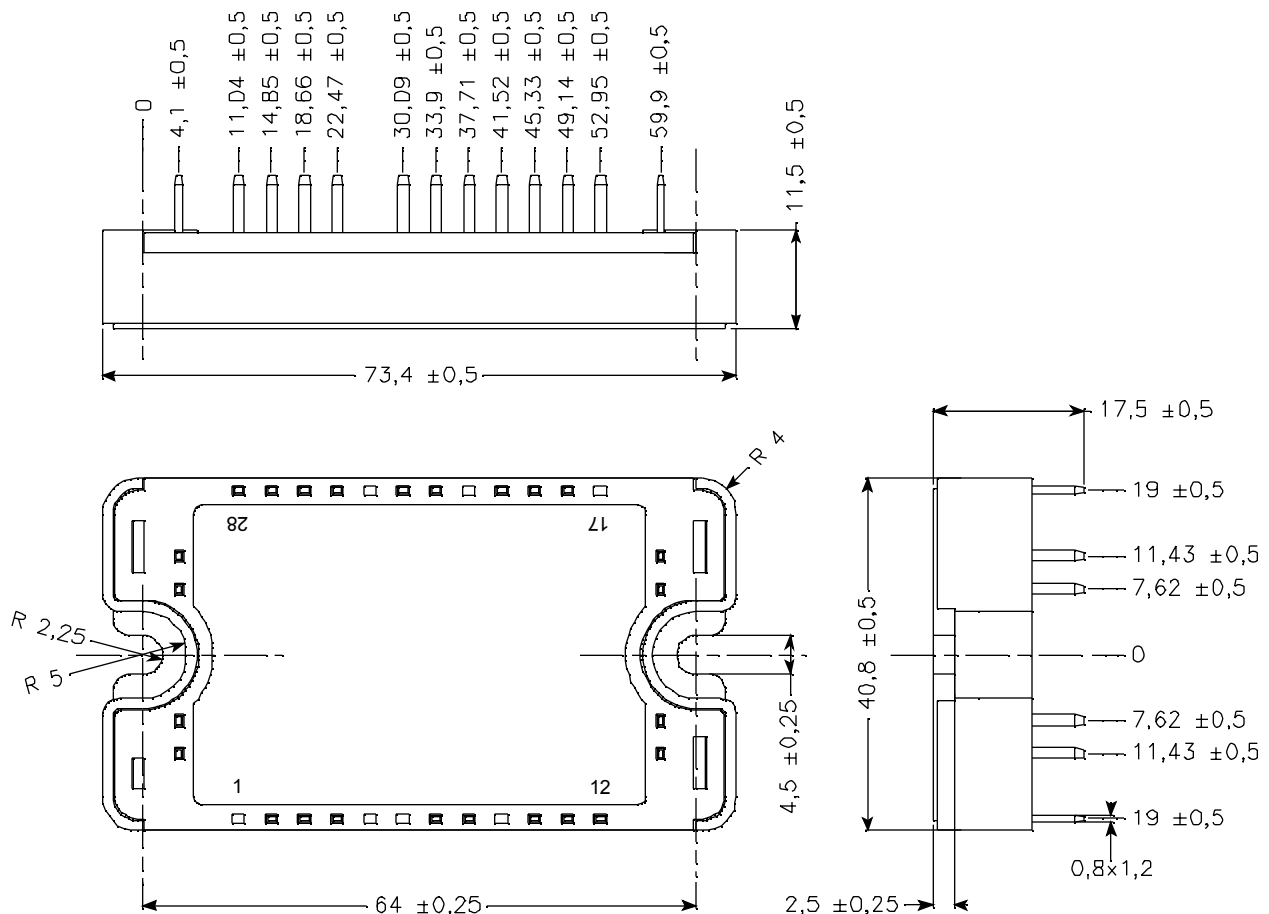
$$R_T = \frac{R_{25}}{\exp\left[B_{25/85}\left(\frac{1}{T_{25}} - \frac{1}{T}\right)\right]}$$

T: Thermistor temperature
R_T: Thermistor value at T

Thermal and package characteristics

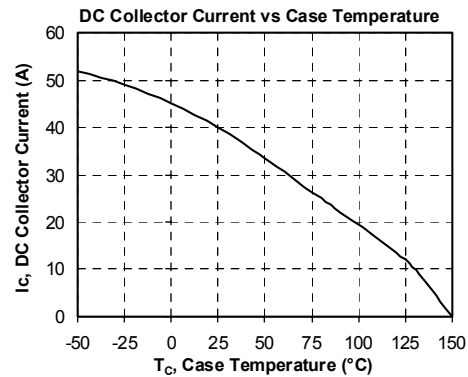
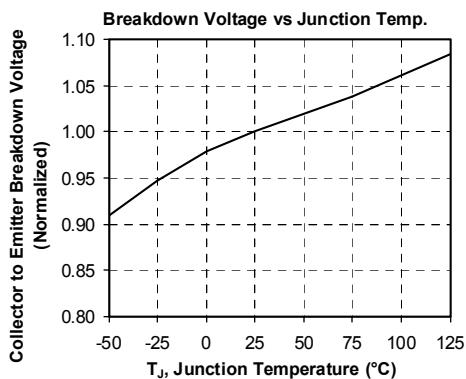
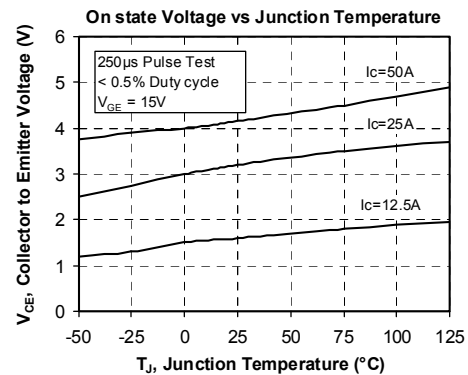
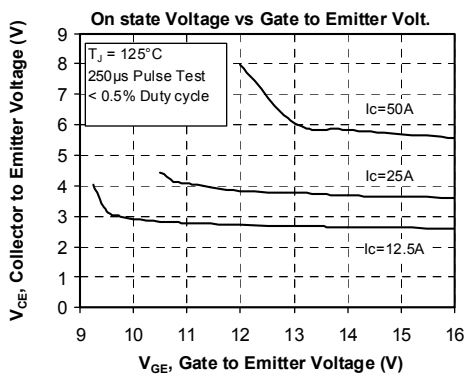
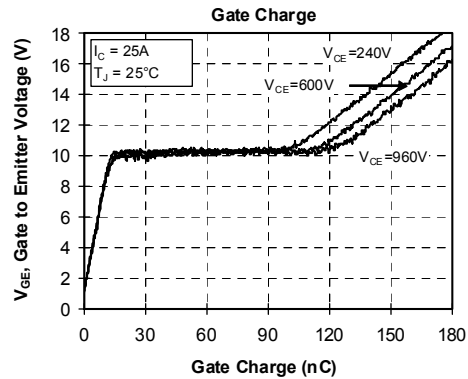
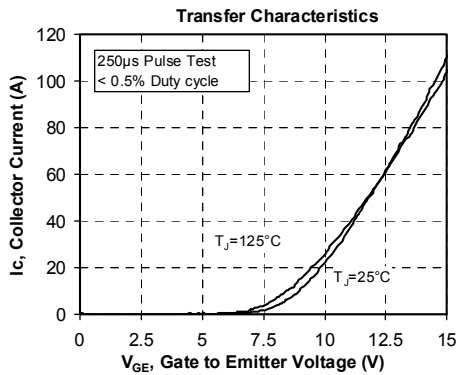
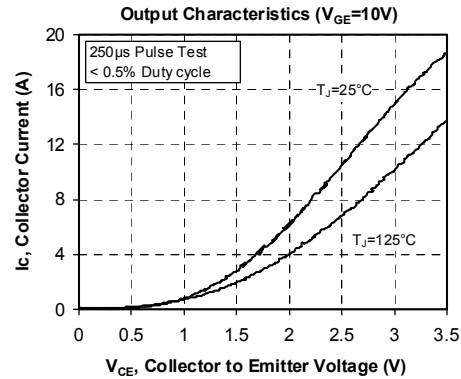
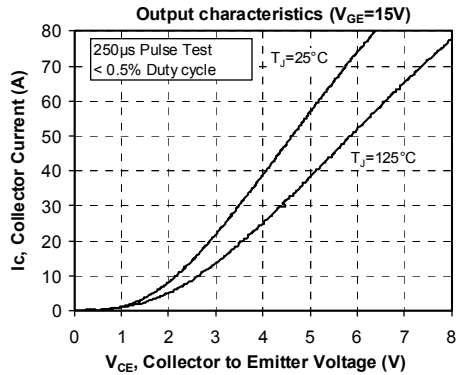
Symbol	Characteristic			Min	Typ	Max	Unit
R _{thJC}	Junction to Case Thermal Resistance			IGBT		0.6	°C/W
				Diode		0.9	
V _{ISOL}	RMS Isolation Voltage, any terminal to case t =1 min, I isol<1mA, 50/60Hz			2500			V
T _J	Operating junction temperature range			-40		150	°C
T _{STG}	Storage Temperature Range			-40		125	
T _C	Operating Case Temperature			-40		100	
Torque	Mounting torque	To heatsink	M4	2.5		4.7	N.m
Wt	Package Weight					110	g

SP3 Package outline (dimensions in mm)

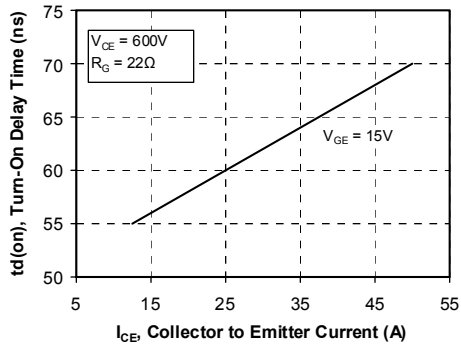


See application note 1901 - Mounting Instructions for SP3 Power Modules on www.microsemi.com

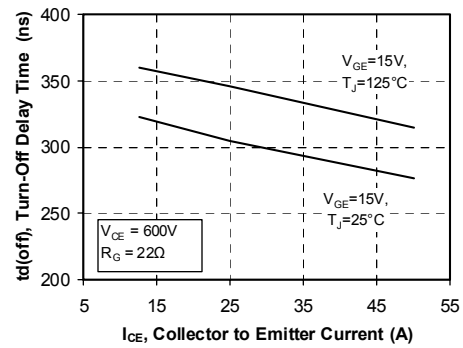
Typical Performance Curve



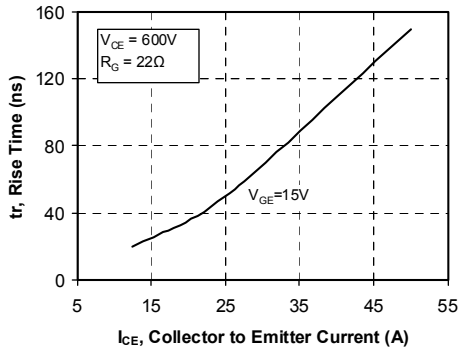
Turn-On Delay Time vs Collector Current



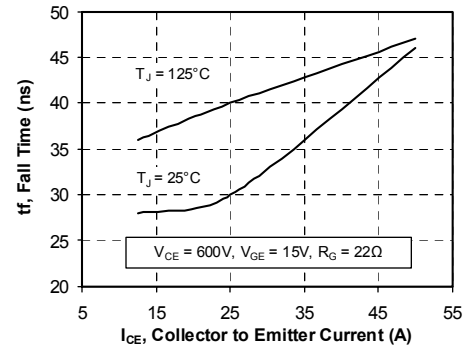
Turn-Off Delay Time vs Collector Current



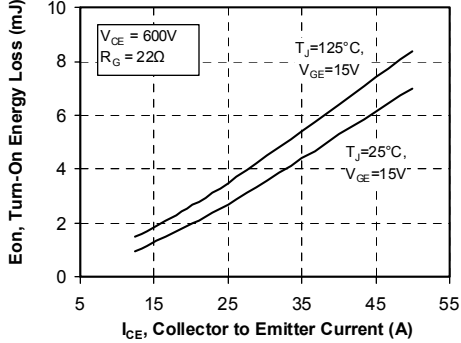
Current Rise Time vs Collector Current



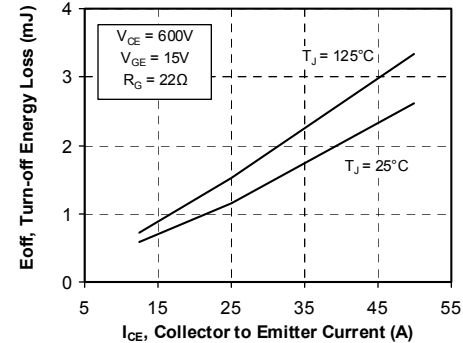
Current Fall Time vs Collector Current



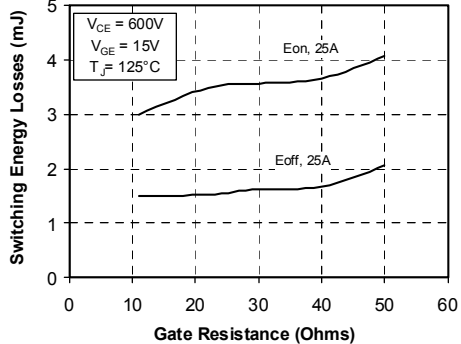
Turn-On Energy Loss vs Collector Current



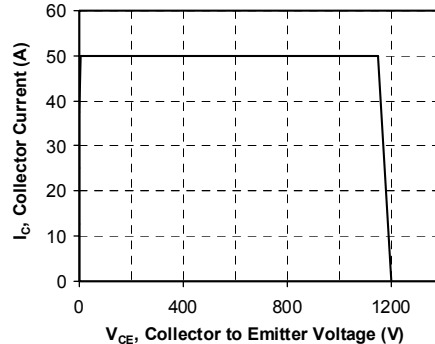
Turn-Off Energy Loss vs Collector Current

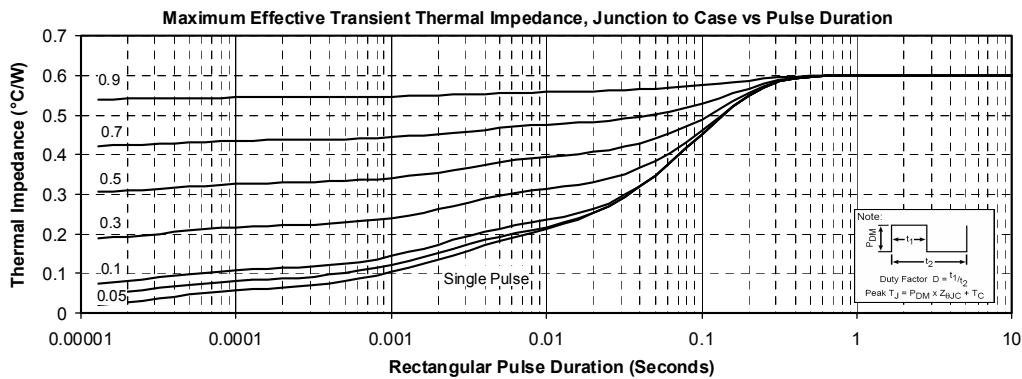
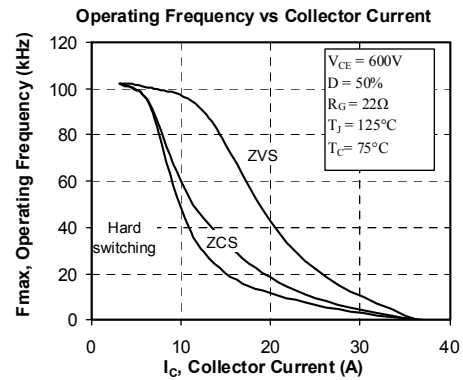
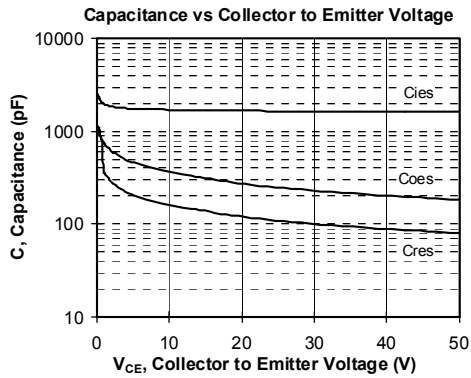


Switching Energy Losses vs Gate Resistance



Reverse Bias Safe Operating Area





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

Microsemi's products are covered by one or more of U.S. patents 4,895,810 5,045,903 5,089,434 5,182,234 5,019,522 5,262,336 6,503,786 5,256,583 4,748,103 5,283,202 5,231,474 5,434,095 5,528,058 and foreign patents. U.S. and Foreign patents pending. All Rights Reserved.