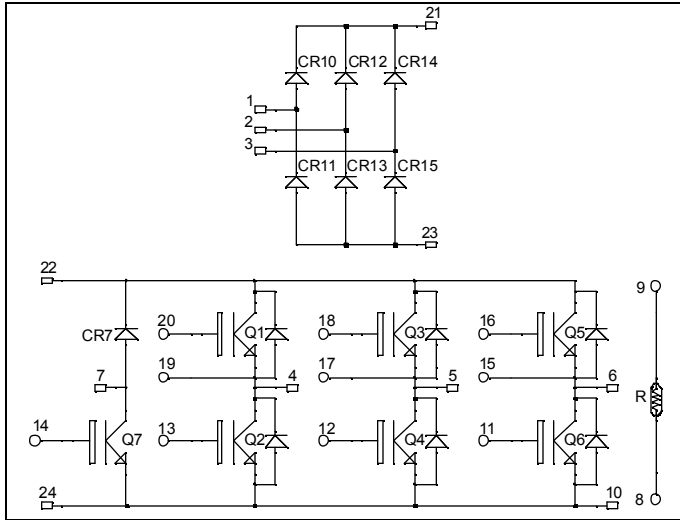
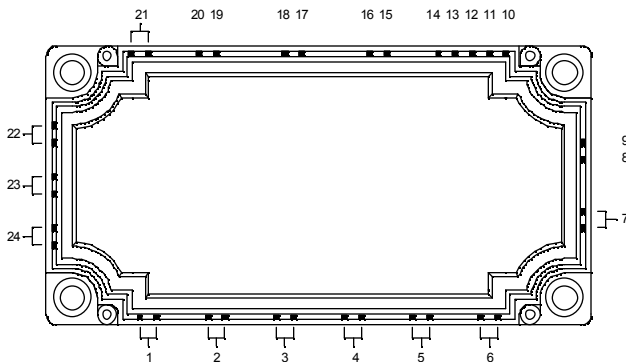


Input rectifier bridge + Brake + 3 Phase Bridge
Trench + Field Stop IGBT®
Power Module

$V_{CES} = 1200V$
 $I_C = 75A @ T_c = 80^\circ C$



APTGT75X120RTP3G: Without Brake (Pin 7 & 14 not connected)



Application

- AC Motor control

Features

- Trench + Field Stop IGBT® Technology
 - Low voltage drop
 - Low tail current
 - Switching frequency up to 20 kHz
 - Soft recovery parallel diodes
 - Low diode VF
 - Low leakage current
 - Avalanche energy rated
 - RBSOA and SCSOA rated
- Kelvin emitter for easy drive
- Very low stray inductance
- High level of integration
- Internal thermistor for temperature monitoring

Benefits

- Low conduction losses
- Stable temperature behavior
- Very rugged
- Solderable terminals for easy PCB mounting
- Direct mounting to heatsink (isolated package)
- Low junction to case thermal resistance
- Easy paralleling due to positive T_C of V_{CESat}
- Low profile
- RoHS Compliant

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

1. Absolute maximum ratings

Diode rectifier Absolute maximum ratings

Symbol	Parameter	Max ratings	Unit
V_{RRM}	Repetitive Peak Reverse Voltage	1600	V
I_F	DC Forward Current	$T_C = 80^\circ C$ 80	A
I_{FSM}	Surge Forward Current	$T_j = 25^\circ C$ 500	
		$T_j = 150^\circ C$ 400	

CAUTION: These Devices are sensitive to Electrostatic Discharge. Proper Handling Procedures Should Be Followed. See application note APT0502 on www.microsemi.com

IGBT & Diode Brake (only for APTGT75X120BTP3G) Absolute maximum ratings

<i>Symbol</i>	<i>Parameter</i>		<i>Max ratings</i>	<i>Unit</i>
V_{CES}	Collector - Emitter Breakdown Voltage		1200	V
I_C	Continuous Collector Current	$T_C = 25^\circ\text{C}$	55	A
		$T_C = 80^\circ\text{C}$	35	
I_{CM}	Pulsed Collector Current	$T_C = 25^\circ\text{C}$	70	
V_{GE}	Gate – Emitter Voltage		± 20	V
P_D	Maximum Power Dissipation	$T_C = 25^\circ\text{C}$	200	W
I_F	DC Forward Current	$T_C = 80^\circ\text{C}$	25	A

IGBT & Diode Inverter Absolute maximum ratings

<i>Symbol</i>	<i>Parameter</i>		<i>Max ratings</i>	<i>Unit</i>
V_{CES}	Collector - Emitter Breakdown Voltage		1200	V
I_C	Continuous Collector Current	$T_C = 25^\circ\text{C}$	105	A
		$T_C = 80^\circ\text{C}$	75	
I_{CM}	Pulsed Collector Current	$T_C = 25^\circ\text{C}$	150	
V_{GE}	Gate – Emitter Voltage		± 20	V
P_D	Maximum Power Dissipation	$T_C = 25^\circ\text{C}$	350	W
RBSOA	Reverse Bias Safe Operating Area	$T_j = 125^\circ\text{C}$	150A @ 1100V	
I_F	DC Forward Current	$T_C = 80^\circ\text{C}$	75	A
I_{FRM}	Repetitive Peak Forward Current	$t_p = 1\text{ms}$	150	

2. Electrical Characteristics

Diodes Rectifier Electrical Characteristics

<i>Symbol</i>	<i>Characteristic</i>	<i>Test Conditions</i>		<i>Min</i>	<i>Typ</i>	<i>Max</i>	<i>Unit</i>
I_R	Reverse Current	$V_R = 1600\text{V}$	$T_j = 150^\circ\text{C}$		3		mA
V_F	Forward Voltage	$I_F = 75\text{A}$	$T_j = 150^\circ\text{C}$		1.1		V
R_{thJC}	Junction to Case Thermal Resistance					0.65	$^\circ\text{C/W}$

IGBT Brake & Diode (only for APTGT75X120BTP3G) Electrical Characteristics

<i>Symbol</i>	<i>Characteristic</i>	<i>Test Conditions</i>		<i>Min</i>	<i>Typ</i>	<i>Max</i>	<i>Unit</i>
I_{CES}	Zero Gate Voltage Collector Current	$V_{GE} = 0\text{V}, V_{CE} = 1200\text{V}$				250	μA
$V_{CE(sat)}$	Collector Emitter on Voltage	$V_{GE} = 15\text{V}$ $I_C = 35\text{A}$	$T_j = 25^\circ\text{C}$	1.4	1.7	2.1	V
			$T_j = 125^\circ\text{C}$		2.0		
$V_{GE(th)}$	Gate Threshold Voltage	$V_{GE} = V_{CE}, I_C = 2\text{mA}$		5.0	5.8	6.5	V
I_{GES}	Gate – Emitter Leakage Current	$V_{GE} = 20\text{V}, V_{CE} = 0\text{V}$				600	nA
C_{ies}	Input Capacitance	$V_{GE} = 0\text{V}$			2500		pF
C_{oes}	Output Capacitance	$V_{CE} = 25\text{V}$			132		
C_{res}	Reverse Transfer Capacitance	$f = 1\text{MHz}$			115		
V_F	Forward Voltage	$V_{GE} = 0\text{V}$ $I_F = 25\text{A}$	$T_j = 25^\circ\text{C}$		1.6		V
			$T_j = 125^\circ\text{C}$		1.6		
R_{thJC}	Junction to Case Thermal Resistance	IGBT				0.6	$^\circ\text{C/W}$
		Diode				1.2	

IGBT & Diode Inverter Electrical Characteristics

Symbol	Characteristic	Test Conditions	Min	Typ	Max	Unit
I_{CES}	Zero Gate Voltage Collector Current	$V_{GE} = 0V, V_{CE} = 1200V$			250	μA
$V_{CE(sat)}$	Collector Emitter on Voltage	$V_{GE} = 15V$ $I_C = 75A$	$T_j = 25^\circ C$ $T_j = 125^\circ C$	1.7 2.0	2.1	V
$V_{GE(th)}$	Gate Threshold Voltage	$V_{GE} = V_{CE}, I_C = 3 mA$	5.0	5.8	6.5	V
I_{GES}	Gate – Emitter Leakage Current	$V_{GE} = 20V, V_{CE} = 0V$			500	nA
C_{ies}	Input Capacitance	$V_{GE} = 0V$		5345		pF
C_{oss}	Output Capacitance	$V_{CE} = 25V$		280		
C_{rss}	Reverse Transfer Capacitance	$f = 1MHz$		242		
$T_{d(on)}$	Turn-on Delay Time	Inductive Switching ($25^\circ C$) $V_{GE} = \pm 15V$ $V_{Bus} = 600V$ $I_C = 75A$ $R_G = 4.7\Omega$		260		ns
T_r	Rise Time			30		
$T_{d(off)}$	Turn-off Delay Time			420		
T_f	Fall Time			65		
$T_{d(on)}$	Turn-on Delay Time	Inductive Switching ($125^\circ C$) $V_{GE} = \pm 15V$ $V_{Bus} = 600V$ $I_C = 75A$ $R_G = 4.7\Omega$		285		ns
T_r	Rise Time			45		
$T_{d(off)}$	Turn-off Delay Time			520		
T_f	Fall Time			90		
E_{on}	Turn on Energy	$V_{GE} = \pm 15V$ $V_{Bus} = 600V$ $I_C = 75A$	$T_j = 125^\circ C$	9.4		mJ
E_{off}	Turn off Energy	$R_G = 4.7\Omega$	$T_j = 125^\circ C$	9.4		
V_F	Forward Voltage	$V_{GE} = 0V$ $I_F = 75A$	$T_j = 25^\circ C$ $T_j = 125^\circ C$	1.6 1.6	2.2	V
Q_{rr}	Reverse Recovery Charge	$I_F = 75A$ $V_R = 600V$ $di/dt = 2000A/\mu s$	$T_j = 25^\circ C$ $T_j = 125^\circ C$	8 14		μC
E_r	Reverse Recovery Energy		$T_j = 25^\circ C$ $T_j = 125^\circ C$	3 5.5		mJ
R_{thJC}	Junction to Case Thermal Resistance		IGBT Diode		0.35 0.58	$^\circ C/W$

Temperature sensor NTC

Symbol	Characteristic	Min	Typ	Max	Unit
R_{25}	Resistance @ $25^\circ C$		5		k Ω
$B_{25/50}$	$T_{25} = 298.16 K$		3375		K

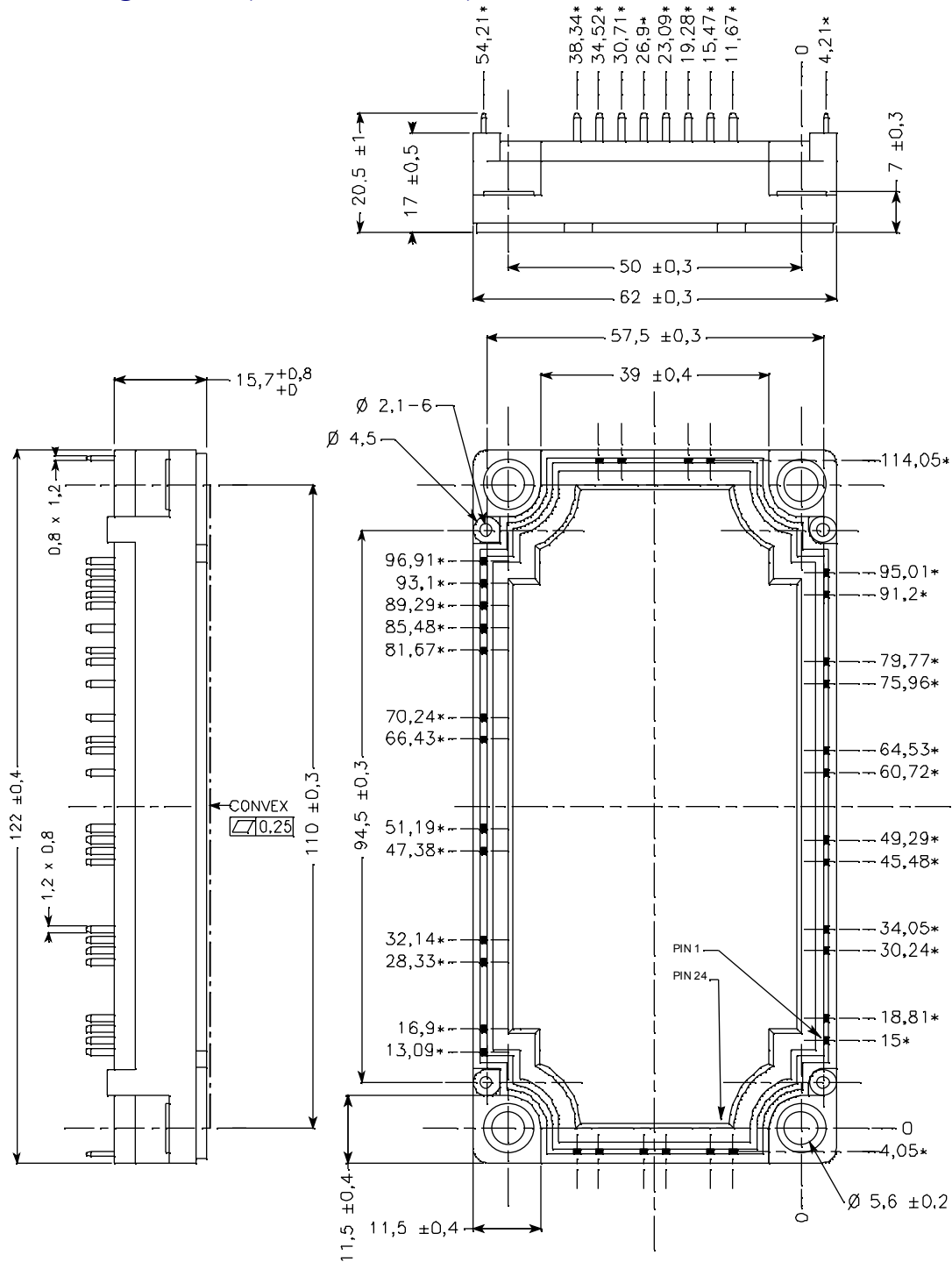
$$R_T = \frac{R_{25}}{\exp \left[B_{25/50} \left(\frac{1}{T_{25}} - \frac{1}{T} \right) \right]}$$

T: Thermistor temperature
 R_T : Thermistor value at T

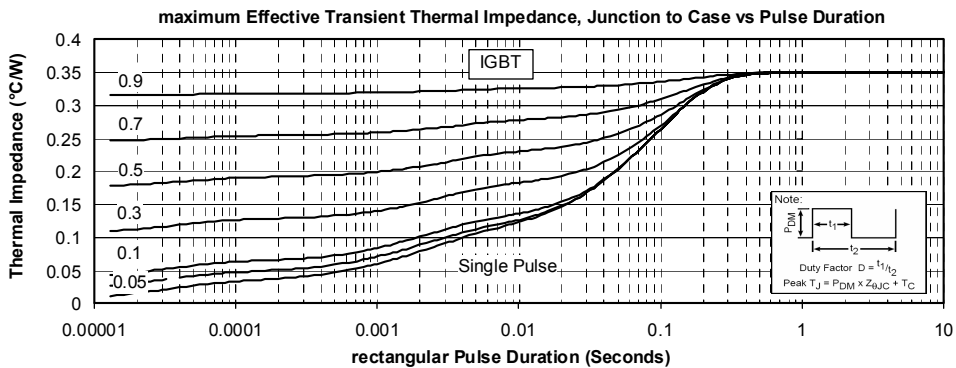
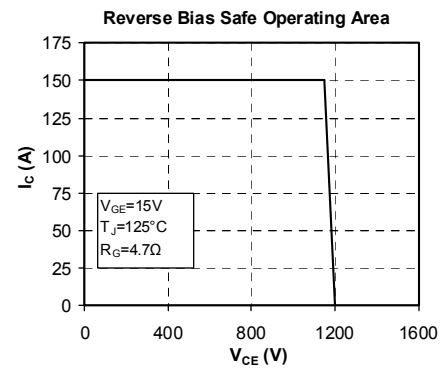
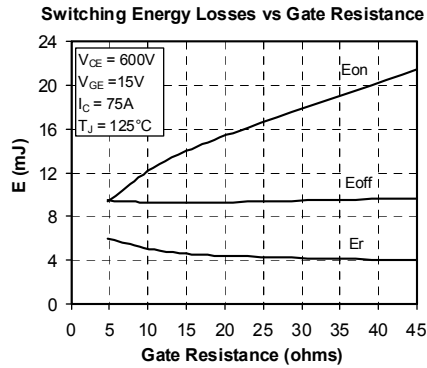
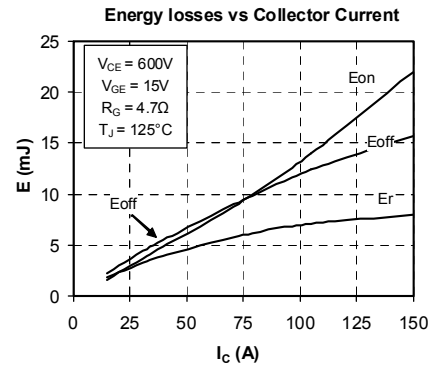
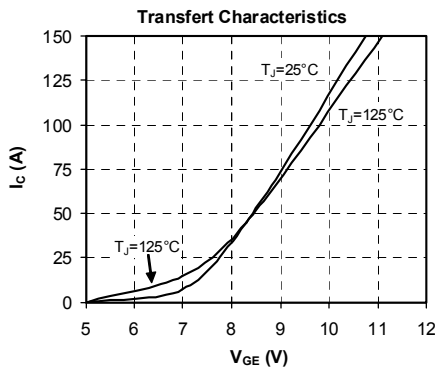
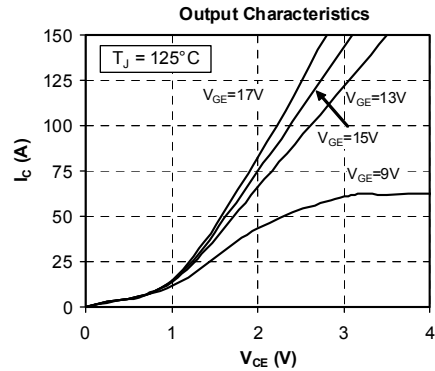
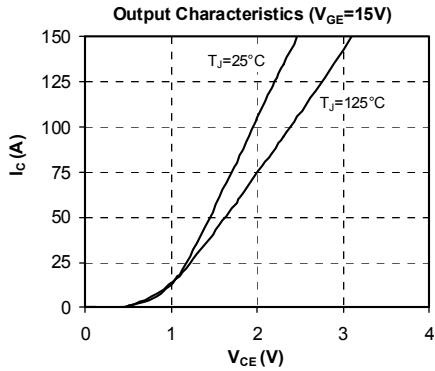
3. Thermal and package characteristics

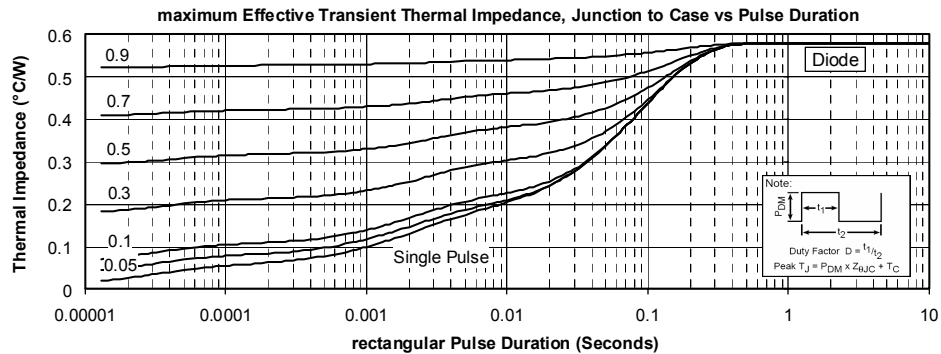
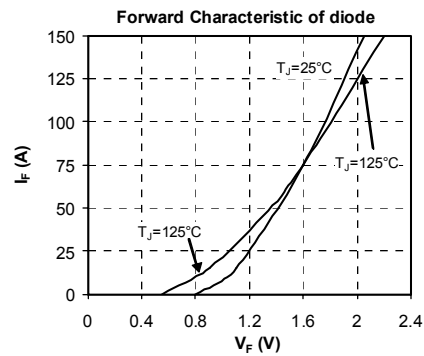
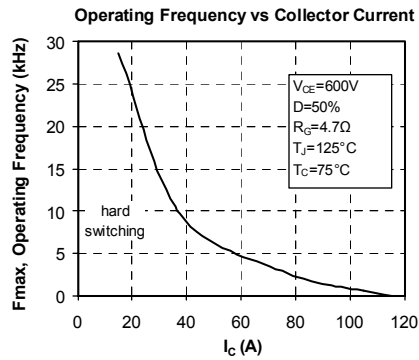
Symbol	Characteristic			Min	Typ	Max	Unit
V _{ISOL}	RMS Isolation Voltage, any terminal to case t =1 min, I _{isol} <1mA, 50/60Hz			2500			V
T _J	Operating junction temperature range			-40		150	°C
T _{STG}	Storage Temperature Range			-40		125	
T _C	Operating Case Temperature			-40		125	
Torque	Mounting torque	To Heatsink	M5	2.5		4.7	N.m
Wt	Package Weight					300	g

4. P3 Package outline (dimensions in mm)

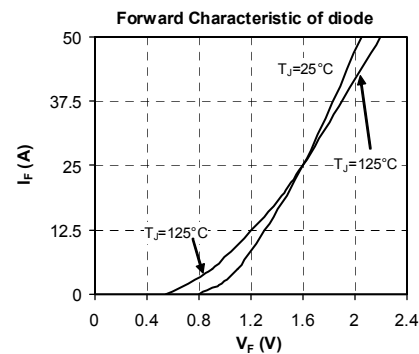
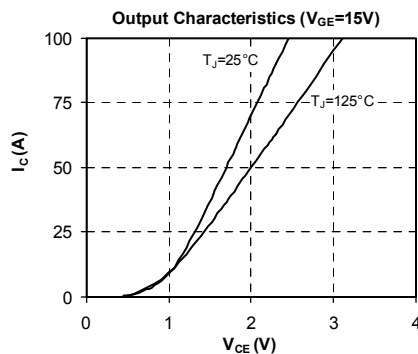


Inverter Typical Performance Curve

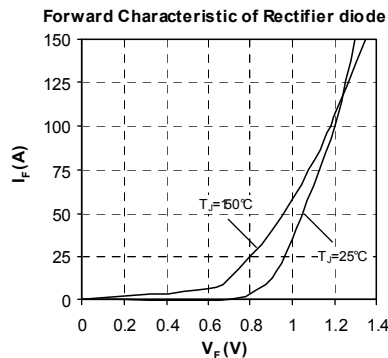




Brake Typical Performance Curve



Rectifier Typical Performance Curve



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.