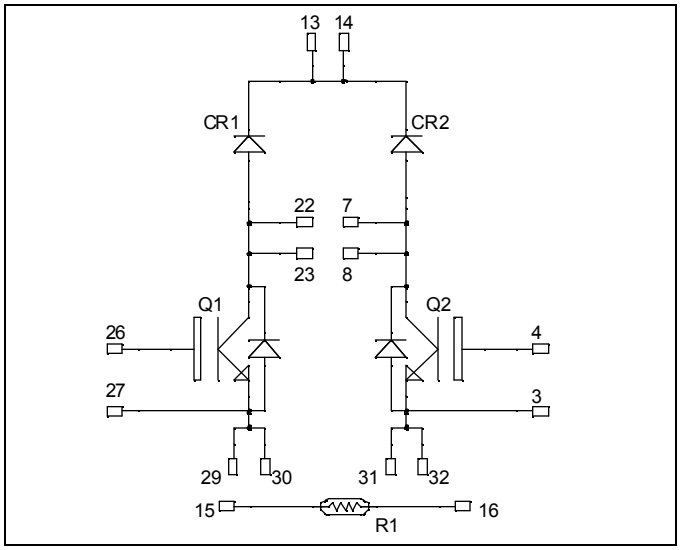
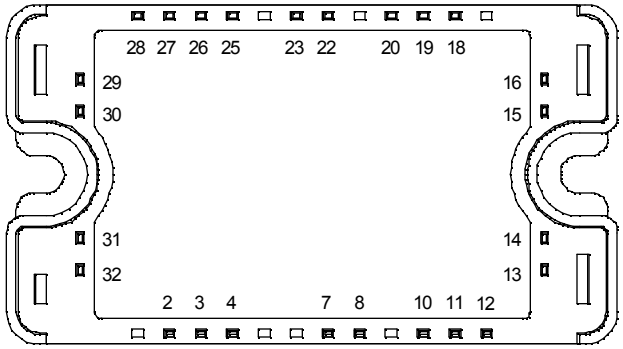
Dual Boost chopper
PT IGBT Power Module

V_{CES} = 600V
I_C = 30A @ Tc = 80°C





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

Application

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

Features

- Power MOS 7® Punch Through (PT) IGBT
  - Low conduction loss
  - Ultra fast tail current shutoff
  - Low gate charge
  - Switching frequency capability in the 200kHz range
  - Soft recovery parallel diodes
  - Low diode VF
- Kelvin emitter for easy drive
- Very low stray inductance
  - Symmetrical design
- Internal thermistor for temperature monitoring
- High level of integration

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
- Each leg can be easily paralleled to achieve a single boost of twice the current capability.

Absolute maximum ratings

Symbol	*Parameter*		*Max ratings*	*Unit*
V_{CES}	Collector - Emitter Breakdown Voltage		600	V
I_C	Continuous Collector Current	T_c = 25°C	48	A
		T_c = 80°C	30	
I_{CM}	Pulsed Collector Current	T_c = 25°C	120	
V_{GE}	Gate – Emitter Voltage		±20	V
P_D	Maximum Power Dissipation	T_c = 25°C	156	W
SSOA	Switching Safe Operating Area	T_j = 150°C	120A @ 600V	

CAUTION: These Devices are sensitive to Electrostatic Discharge. Proper Handing Procedures Should Be Followed.

All ratings @ T_j = 25°C unless otherwise specified

Electrical Characteristics

Symbol	*Characteristic*	*Test Conditions*		*Min*	*Typ*	*Max*	*Unit*
BV_{CES}	Collector - Emitter Breakdown Voltage	V_{GE} = 0V, I_C = 500µA		600			V
I_{CES}	Zero Gate Voltage Collector Current	V_{GE} = 0V V_{CE} = 600V	T_j = 25°C			500	µA
			T_j = 125°C			3000	
$V_{CE(on)}$	Collector Emitter on Voltage	V_{GE} =15V I_C = 30 A	T_j = 25°C		2.2	2.7	V
			T_j = 125°C		2.1		
$V_{GE(th)}$	Gate Threshold Voltage	V_{GE} = V_{CE}, I_C = 1mA		3		6	V
I_{GES}	Gate – Emitter Leakage Current	V_{GE} = ±20V, V_{CE} = 0V				±100	nA

Dynamic Characteristics

Symbol	*Characteristic*	*Test Conditions*	*Min*	*Typ*	*Max*	*Unit*
C_{ies}	Input Capacitance	V_{GE} = 0V V_{CE} = 25V f = 1MHz		3200		pF
C_{oes}	Output Capacitance			295		
C_{res}	Reverse Transfer Capacitance			20		
Q_g	Total gate Charge	V_{GE} = 15V V_{Bus} = 300V I_C = 30A		90		nC
Q_{ge}	Gate – Emitter Charge			20		
Q_{gc}	Gate – Collector Charge			30		
$T_{d(on)}$	Turn-on Delay Time	Inductive Switching (25°C) V_{GE} = 15V V_{Bus} = 400V I_C = 30A R_G = 5Ω		13		ns
T_r	Rise Time			18		
$T_{d(off)}$	Turn-off Delay Time			55		
T_f	Fall Time			46		
E_{on1}	Turn-on Switching Energy			260		µJ
E_{on2}	Turn-on Switching Energy ❶			335		
E_{off}	Turn-off Switching Energy ❷			250		
$T_{d(on)}$	Turn-on Delay Time	Inductive Switching (125°C) V_{GE} = 15V V_{Bus} = 400V I_C = 30A R_G = 5Ω		13		ns
T_r	Rise Time			18		
$T_{d(off)}$	Turn-off Delay Time			84		
T_f	Fall Time			80		
E_{on1}	Turn-on Switching Energy			260		µJ
E_{on2}	Turn-on Switching Energy ❶			508		
E_{off}	Turn-off Switching Energy ❷			518		

❶ E_{on2} includes diode reverse recovery
❷ In accordance with JEDEC standard JESD24-1

Temperature sensor NTC

Symbol	*Characteristic*	*Min*	*Typ*	*Max*	*Unit*
R_{25}	Resistance @ 25°C		68		kΩ
$B_{25/85}$	T_{25} = 298.16 K		4080		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

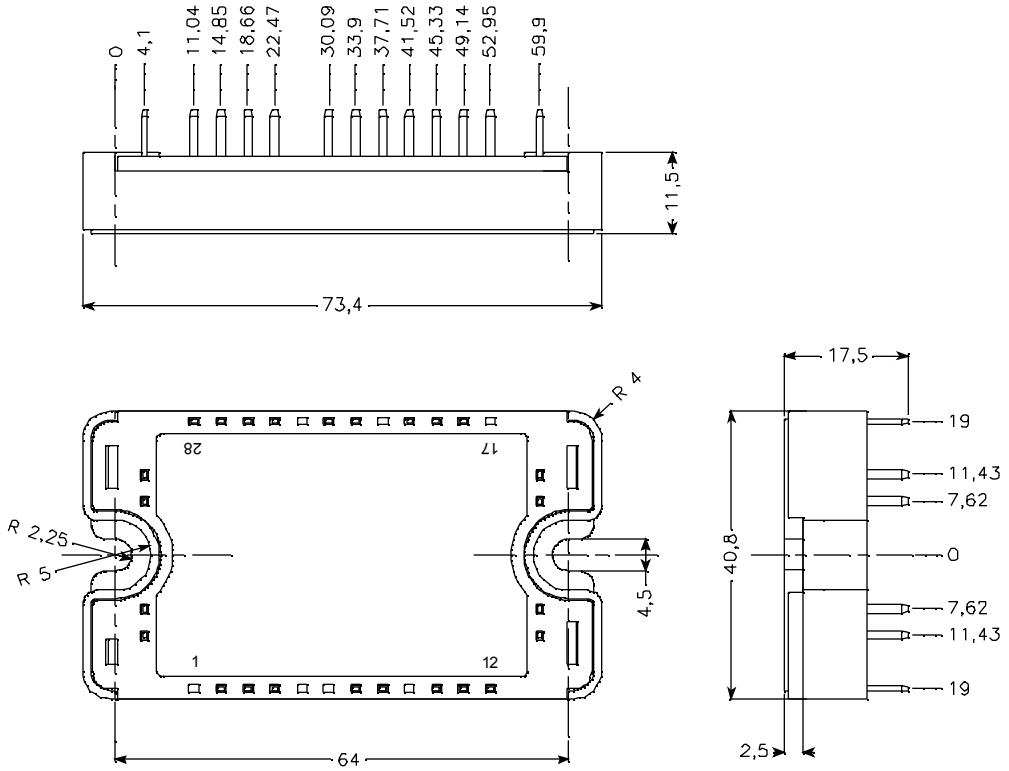
Diode ratings and characteristics

Symbol	Characteristic	Test Conditions		Min	Typ	Max	Unit
V_{RRM}	Maximum Peak Repetitive Reverse Voltage			600			V
I_{RM}	Maximum Reverse Leakage Current	V_R=600V	T_j = 25°C			250	µA
			T_j = 125°C			500	
$I_{F(AV)}$	Maximum Average Forward Current	50% duty cycle	Tc = 85°C		30		A
V_F	Diode Forward Voltage	I_F = 30A			2.2	2.7	V
		I_F = 60A			2.7		
		I_F = 30A	T_j = 150°C		1.5		
t_{rr}	Reverse Recovery Time	I_F = 30A V_R = 400V di/dt =200A/µs	T_j = 25°C		74		ns
			T_j = 100°C		74		
Q_{rr}	Reverse Recovery Charge		T_j = 25°C		123		nC
			T_j = 100°C		288		

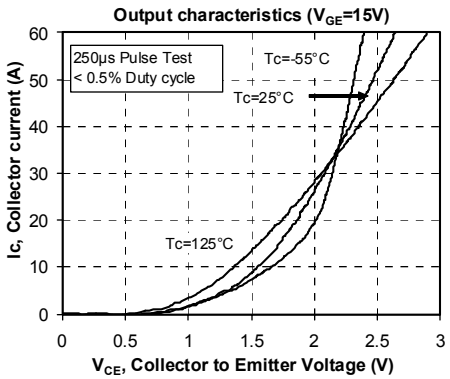
Thermal and package characteristics

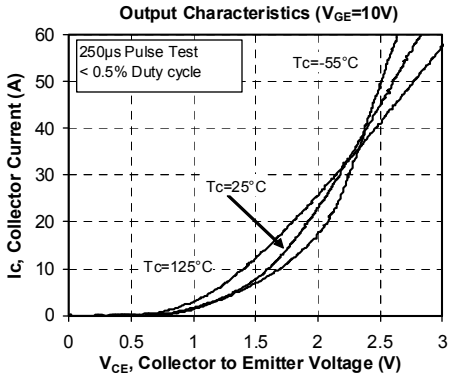
Symbol	Characteristic			Min	Typ	Max	Unit
R_{thJC}	Junction to Case		IGBT			0.8	°C/W
			Diode			1.2	
V_{ISOL}	RMS Isolation Voltage, any terminal to case t =1 min, I isol<1mA, 50/60Hz			2500			V
T_J	Operating junction temperature range			-40		150	°C
T_{STG}	Storage Temperature Range			-40		125	
T_C	Operating Case Temperature			-40		100	
Torque	Mounting torque	To heatsink	M4			4.7	N.m
Wt	Package Weight					110	g

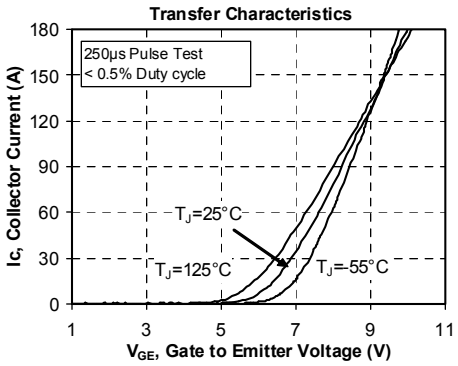
Package outline

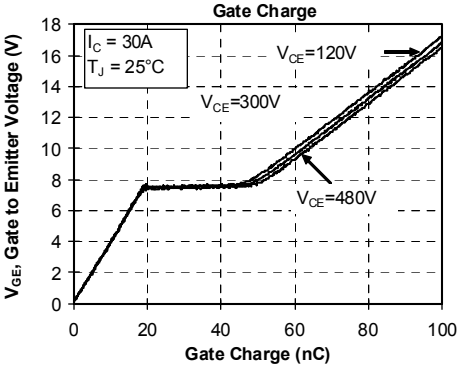


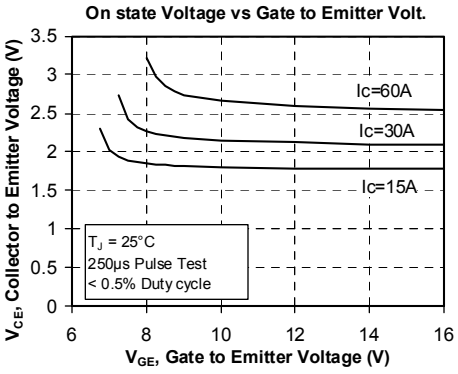
Typical Performance Curve

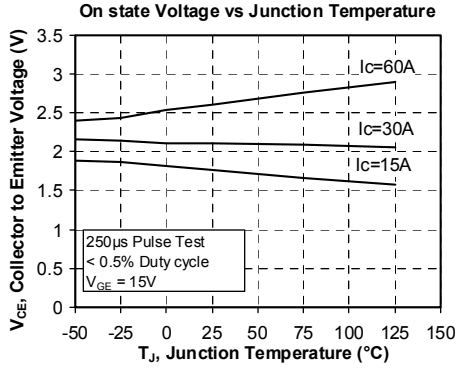


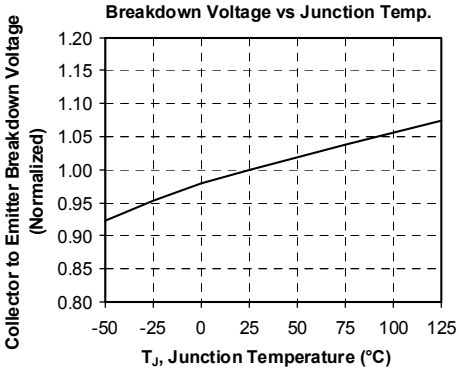


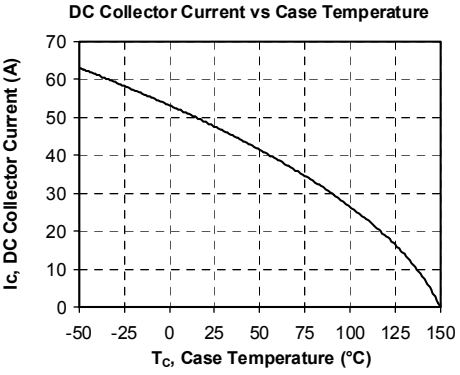




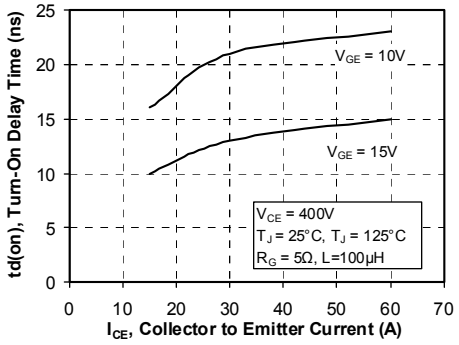








Turn-On Delay Time vs Collector Current



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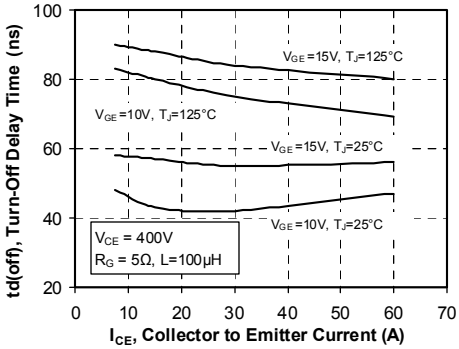
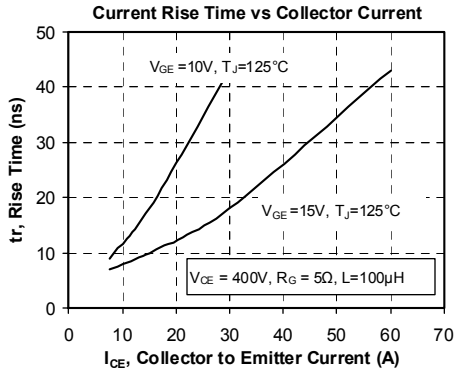
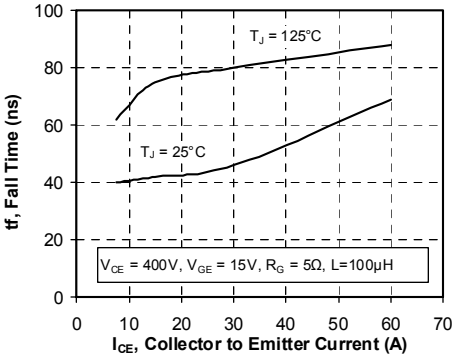


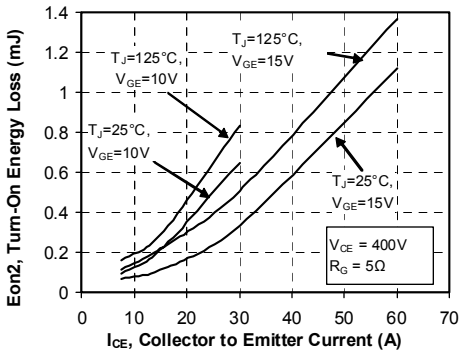
Current Rise Time vs Collector Current



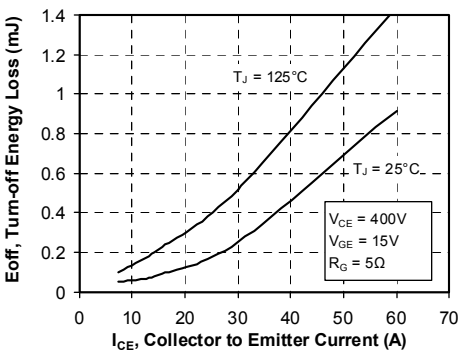
Current Fall Time vs Collector Current



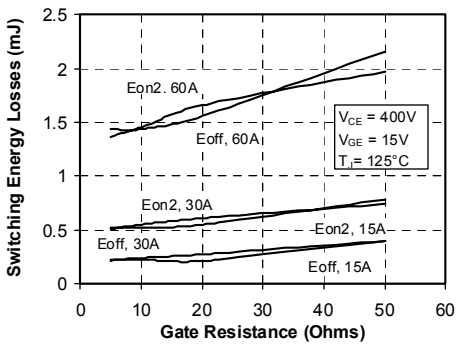
Turn-On Energy Loss vs Collector Current



Turn-Off Energy Loss vs Collector Current



Switching Energy Losses vs Gate Resistance



Switching Energy Losses vs Junction Temp.