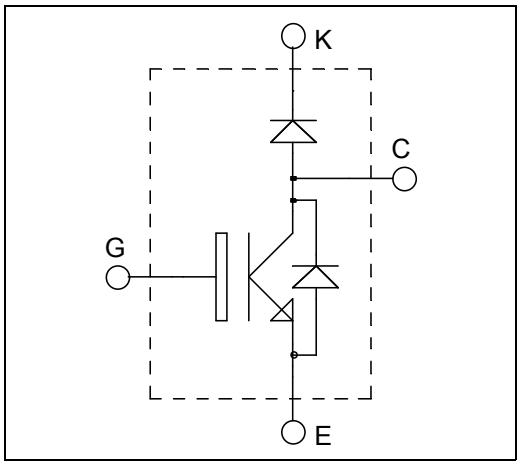
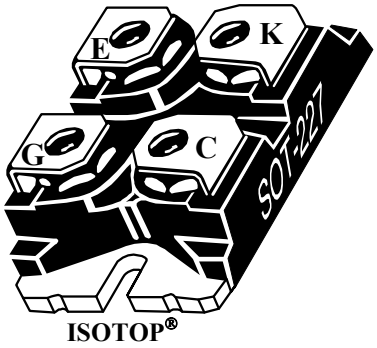
APT50GLQ65JU2

ISOTOP® Boost chopper
High speed Trench + Field Stop IGBT4
Power Module

V_{CES} = 650V
I_C = 50A @ Tc = 80°C





ISOTOP®

Application

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

Features

- ***High speed Trench + Field Stop IGBT 4***
  - Low voltage drop
  - Low leakage current
  - Low switching losses
- ISOTOP® Package (SOT-227)
- Very low stray inductance

Benefits

- Low conduction losses
- Stable temperature behavior
- Direct mounting to heatsink (isolated package)
- Low junction to case thermal resistance
- Easy paralleling due to positive T_C of V_{CEsat}
- RoHS Compliant

All ratings @ T_j = 25°C unless otherwise specified

Absolute maximum ratings

Symbol	*Parameter*		*Max ratings*	*Unit*
V_{CES}	Collector - Emitter Voltage		650	V
I_C	Continuous Collector Current	T_C = 25°C	80	A
		T_C = 80°C	50	
I_{CM}	Pulsed Collector Current	T_C = 25°C	140	
V_{GE}	Gate – Emitter Voltage		±20	V
P_D	Power Dissipation		220	W

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

Electrical Characteristics

Symbol	Characteristic	Test Conditions		Min	Typ	Max	Unit
I_{CES}	Zero Gate Voltage Collector Current	V_{GE} = 0V, V_{CE} = 650V				50	µA
$V_{CE(sat)}$	Collector Emitter Saturation Voltage	V_{GE} =15V I_C = 50A	T_j = 25°C	1.4	1.85	2.3	V
			T_j = 150°C		2.2		
$V_{GE(th)}$	Gate Threshold Voltage	V_{GE} = V_{CE} , I_C = 0.8 mA		4.2	5.1	5.6	V
I_{GES}	Gate – Emitter Leakage Current	V_{GE} = 20V, V_{CE} = 0V				150	nA

Dynamic Characteristics

Symbol	Characteristic	Test Conditions		Min	Typ	Max	Unit
C_{ies}	Input Capacitance	V_{GE} = 0V V_{CE} = 25V f = 1MHz			3100		pF
C_{oes}	Output Capacitance				116		
C_{res}	Reverse Transfer Capacitance				90		
Q_G	Gate charge	V_{GE} = 15V, I_C = 50A V_{CE} = 480V			315		nC
$T_{d(on)}$	Turn-on Delay Time	Inductive Switching (25°C) V_{GE} = ±15V V_{Bus} = 400V I_C = 50A R_G = 7Ω			19		ns
T_r	Rise Time				33		
$T_{d(off)}$	Turn-off Delay Time				197		
T_f	Fall Time				21		
$T_{d(on)}$	Turn-on Delay Time	Inductive Switching (150°C) V_{GE} = ±15V V_{Bus} = 400V I_C = 50A R_G = 7Ω			19		ns
T_r	Rise Time				29		
$T_{d(off)}$	Turn-off Delay Time				227		
T_f	Fall Time				22		
E_{on}	Turn on Energy	V_{GE} = ±15V V_{Bus} = 400V I_C = 50A R_G = 7Ω	T_j = 150°C		1.2		mJ
E_{off}	Turn off Energy		T_j = 150°C		1		
I_{sc}	Short Circuit data	V_{GE} ≤15V ; V_{Bus} = 400V t_p ≤5µs ; T_j = 150°C			350		A
R_{thJC}	Junction to Case Thermal Resistance					0.68	°C/W

Chopper diode ratings and characteristics

Symbol	Characteristic	Test Conditions		Min	Typ	Max	Unit
V_{RRM}	Peak Repetitive Reverse Voltage					650	V
I_{RM}	Reverse Leakage Current	V_R = 650V				50	µA
I_F	DC Forward Current		Tc = 25°C		50		A
V_F	Diode Forward Voltage	I_F = 50A V_{GE} = 0V	T_j = 25°C		1.6	2	V
			T_j = 150°C		1.5		
t_{rr}	Reverse Recovery Time	I_F = 50A V_R = 300V di/dt =1800A/µs	T_j = 25°C		100		ns
			T_j = 150°C		150		
Q_{rr}	Reverse Recovery Charge		T_j = 25°C		2.6		µC
			T_j = 150°C		5.4		
E_{rr}	Reverse Recovery Energy		T_j = 25°C		0.6		mJ
			T_j = 150°C		1.2		
R_{thJC}	Junction to Case Thermal Resistance					1.14	°C/W

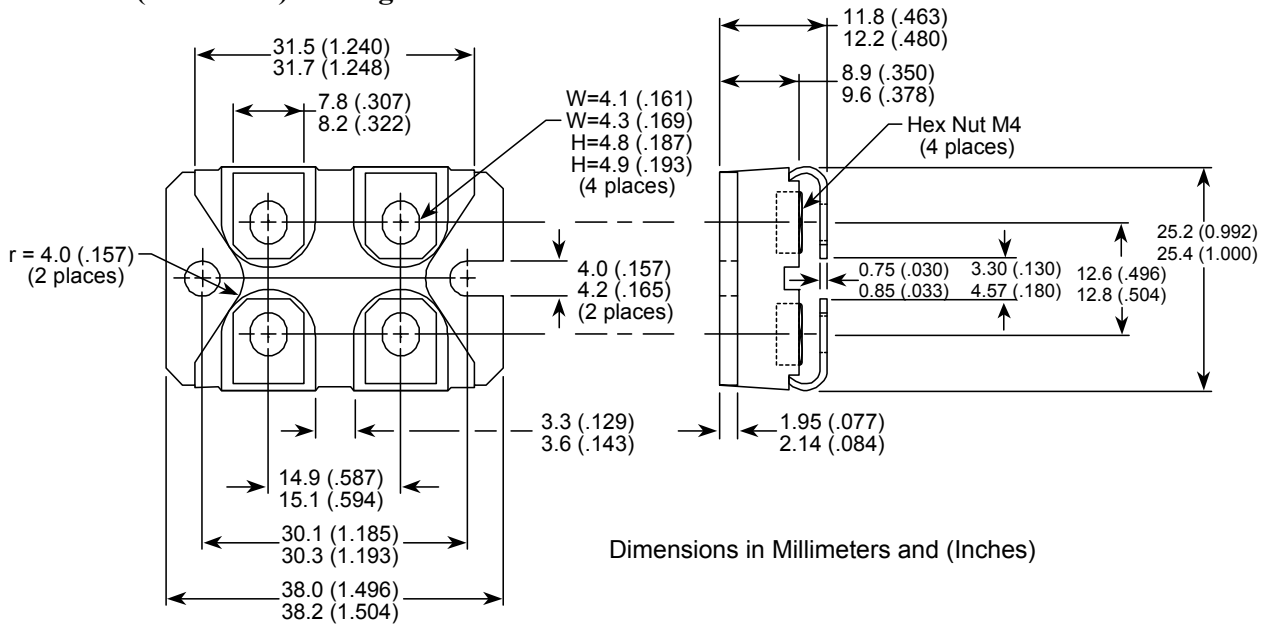
IGBT parallel diode ratings and characteristics

Symbol	Characteristic	Test Conditions		Min	Typ	Max	Unit
V_{RRM}	Peak Repetitive Reverse Voltage					650	V
I_{RM}	Reverse Leakage Current	V_R = 650V				50	µA
I_F	DC Forward Current		Tc = 60°C		20		A
V_F	Diode Forward Voltage	I_F = 20A V_{GE} = 0V	T_j = 25°C		1.6	2	V
			T_j = 150°C		1.5		
t_{rr}	Reverse Recovery Time	I_F = 20A V_R = 300V di/dt =1600A/µs	T_j = 25°C		100		ns
			T_j = 150°C		150		
Q_{rr}	Reverse Recovery Charge		T_j = 25°C		1.1		µC
			T_j = 150°C		2.3		
E_{rr}	Reverse Recovery Energy		T_j = 25°C		0.23		mJ
			T_j = 150°C		0.50		
R_{thJC}	Junction to Case Thermal Resistance					2.6	°C/W

Thermal and package characteristics

Symbol	Characteristic	Min	Typ	Max	Unit
V_{ISOL}	RMS Isolation Voltage, any terminal to case t =1 min, 50/60Hz	2500			V
T_J,T_{STG}	Storage Temperature Range	-55		175	°C
T_{JOP}	Recommended junction temperature under switching conditions	-55		$T_J$max -25	
T_L	Max Lead Temp for Soldering:0.063" from case for 10 sec			300	
Torque	Mounting torque (Mounting = 8-32 or 4mm Machine and terminals = 4mm Machine)			1.5	N.m
Wt	Package Weight		29.2		g

SOT-227 (ISOTOP®) Package Outline



Dimensions in Millimeters and (Inches)

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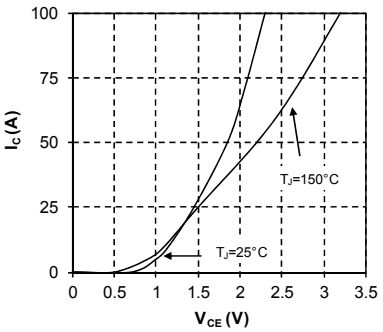
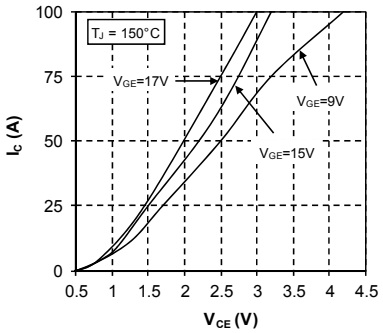
IGBT & Chopper diode Typical Performance Curves

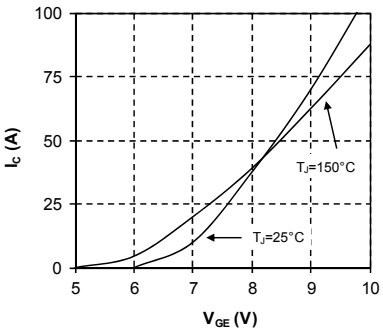
Output Characteristics (V_{GE}=15V)



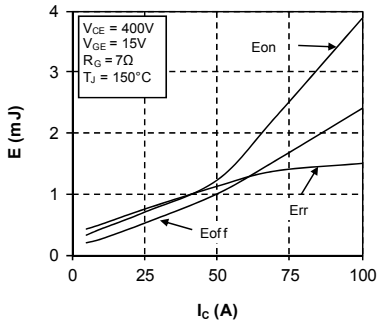
Output Characteristics



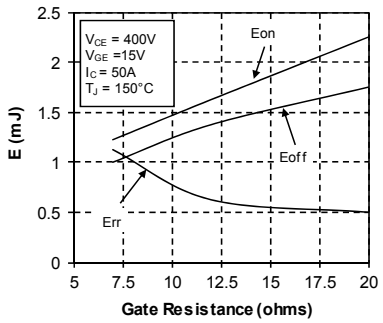
Transfert Characteristics



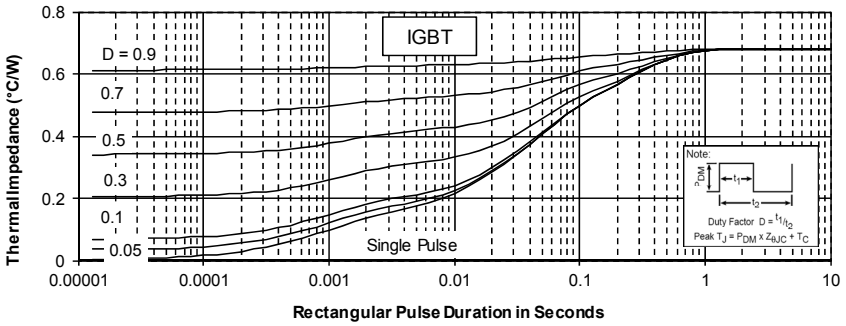
Energy losses vs Collector Current

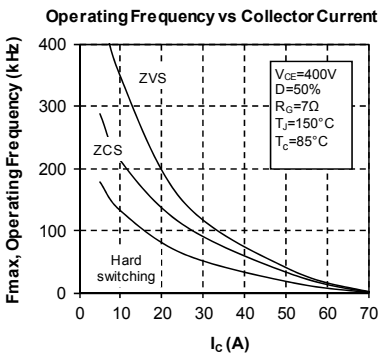


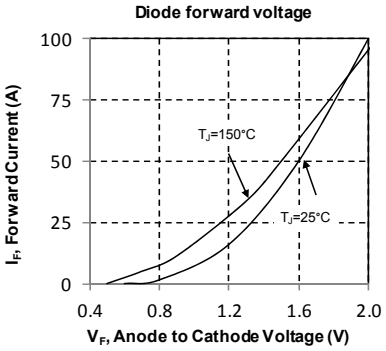
Switching Energy Losses vs Gate Resistance

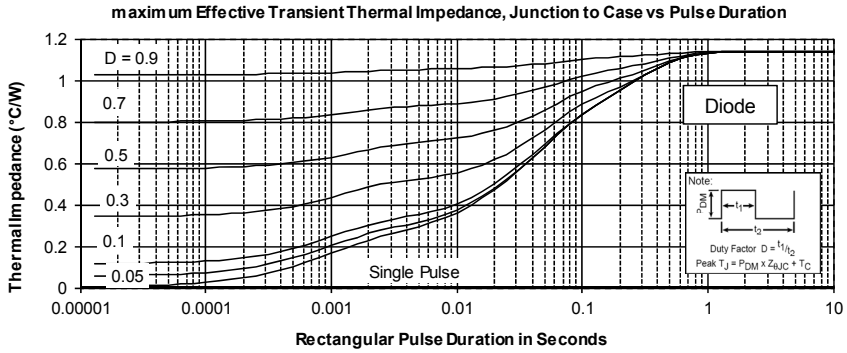


maximum Effective Transient Thermal Impedance, Junction to Case vs Pulse Duration

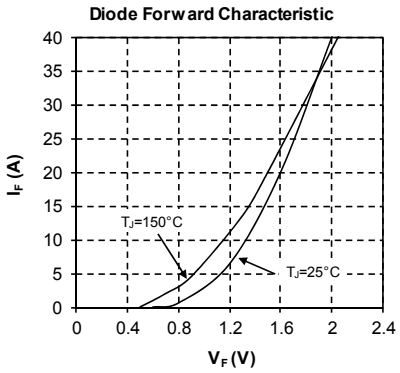


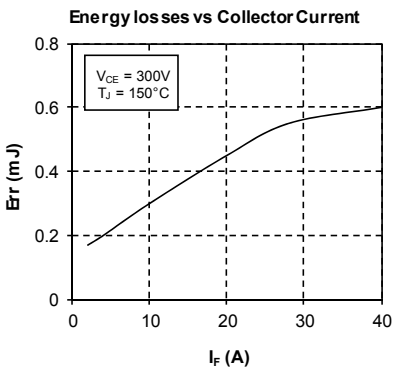


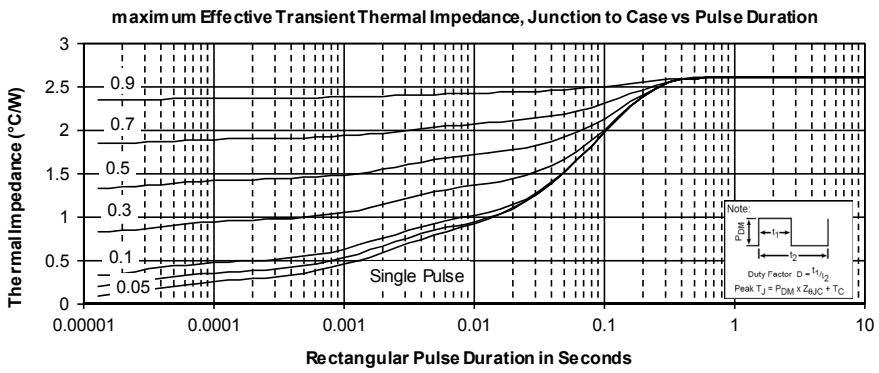




IGBT parallel diode Typical Performance Curves







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