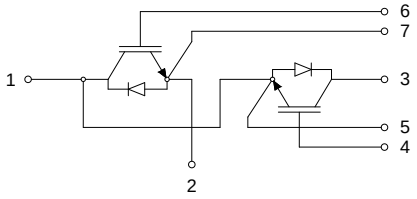
600V 400A, Trench & Field Stop IGBT3 technology with soft, fast recovery anti-parallel diode, in iQPak®2 Module Package

APPLICATIONS

- Motor drives
- UPS
- High power inverters
- Induction heating
- Electronic welders



FEATURES

- IGBT3 - fast trench & field stop IGBT technology
- High switching speed
- Very low $V_{CE(sat)}$
- Short circuit withstand time – 5 us
- High ruggedness, temperature stability
- Soft & fast recovery anti-parallel diode
- Pb-free finished; **RoHS compliant**

MAXIMUM RATINGS (per Leg)

Parameter	Symbol	Value	Units
Collector-emitter voltage	V_{CES}	600	V
DC collector current T_C=80 °C	I_C	400	A
Repetitive peak collector current	I_{CRM}	800	
Diode forward current T_C=80 °C	I_F	400	
Repetitive peak forward current	I_{FRM}	800	
Gate-emitter voltage	V_{GE}	± 20	V
Operating junction and storage temperature	T_j, T_{stg}	-40… +175	°C

Thermal and Isolation Characteristics

Parameter	Symbol	Max. Value	Units
Characteristics			
IGBT thermal resistance, junction to case, (Per Leg)	R_{thJC}	0.11	K/W
Diode thermal resistance, junction to case, (Per Leg)	R_{thJCD}	0.20	
Isolation voltage, RMS (measured between terminals and mounting base, 50-60 Hz, for 1-3 seconds)	V_{iso}	3000	V

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Electrical Characteristics (per Leg), at T_j = 25°C, unless otherwise specified

Parameter	Symbol	Conditions	Value			Unit
			Min.	Typ.	Max.	
Static Characteristics						
Collector-emitter breakdown voltage	$V_{(BR)CES}$	V_{GE} = 0V, I_C = 0.8mA	600	-	-	V
Collector-emitter saturation voltage	$V_{CE(sat)}$	V_{GE} = 15V, I_C = 400A	-	1.5	1.9	
Diode forward voltage	V_F	V_{GE} = 0V, I_F = 400A	-	1.55	1.95	
Gate-emitter threshold voltage	$V_{GE(th)}$	I_C = 6.4 mA, V_{CE} = V_{GE}	4.9	5.8	6.5	
Zero gate voltage collector current	I_{CES}	V_{CE} = 600V, V_{GE} = 0	-	-	4	mA
Gate-emitter leakage current	I_{GES}	V_{CE} = 0V, V_{GE} = 20V,	-	-	400	nA

Electrical Characteristics (per Leg), at T_j = 25°C, unless otherwise specified

Parameter	Symbol	Conditions	Value			Unit
			Min.	Typ.	Max.	
Dynamic Characteristics						
Gate charge	Q_G	V_{CC} = 300V, I_C = 400A V_{GE} = -15V to +15V	-	4.0	-	µC
Input capacitance	C_{iss}	V_{CE} = 25V V_{GE} = 0V f = 1MHz	-	24.8	-	nF
Reverse transfer capacitance	C_{rss}		-	0.76	-	
Short circuit current	I_{SC}	V_{GE} = 15V, $t_p \leq$ 8 µS V_{CC} = 360V,	-	2800	-	A

SWITCHING CHARACTERISTICS (per Leg), at T_j = 25°C, unless otherwise specified

Parameter	Symbol	Conditions	Value			Unit
			Min.	Typ.	Max.	
IGBT Characteristics						
Turn-on delay time	$t_{d(on)}$	V_{CC} = 300V, I_C = 400A, V_{GE} = ±15V, R_G = 1.4Ω, Inductive Load	-	253	-	ns
Rise time	t_r		-	55	-	
Turn-off delay time	$t_{d(off)}$		-	369	-	
Fall time	t_f		-	72	-	
Turn-ON energy	E_{on}		-	27	-	mJ
Turn-OFF energy	E_{off}		-	11	-	

Anti-Parallel Diode Characteristics (per Leg), at T_j = 25°C, unless otherwise specified

Reverse recovery time	t_{rr}	V_R = 300V, I_F = 300A di_F/dt = 1950A/µs	-	438	-	ns
Reverse recovery charge	Q_{rr}		-	20	-	µC
Peak reverse recovery current	I_{rrm}		-	104	-	A

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Figure 1: Typical IGBT turn-on switching times vs R_G, T_j = 25 °C

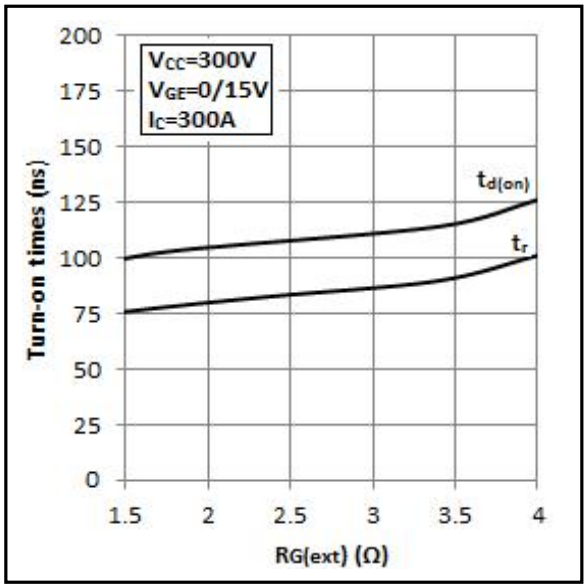


Figure 2: Typical IGBT turn-off switching times vs R_G, T_j = 25 °C

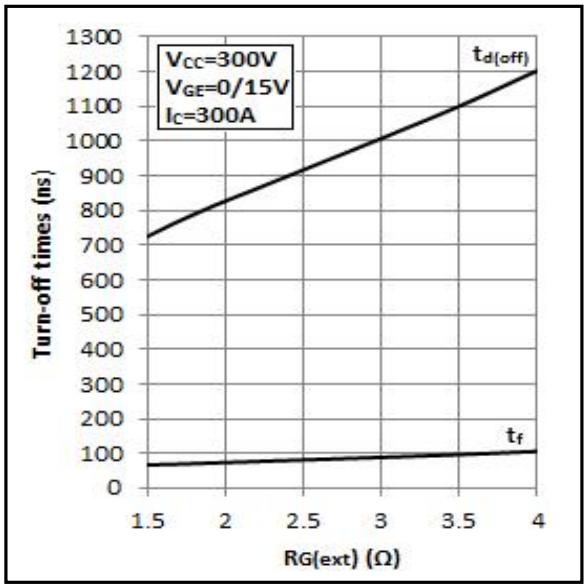


Figure 3: Typical IGBT turn-on switching times vs I_C, T_j = 25 °C

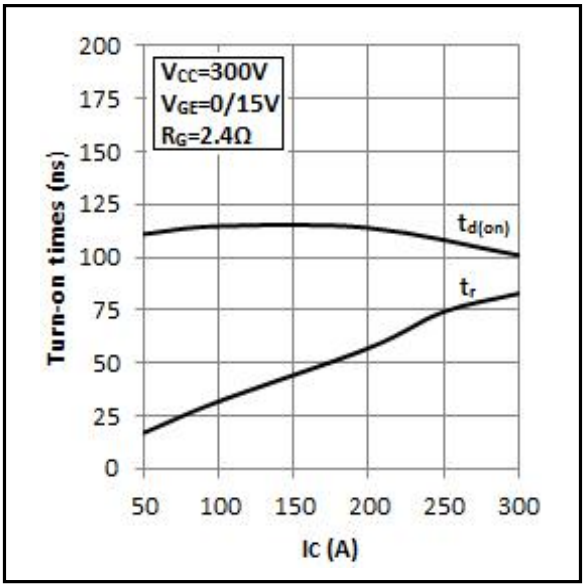


Figure 4: Typical IGBT turn-off switching times vs I_C, T_j = 25 °C

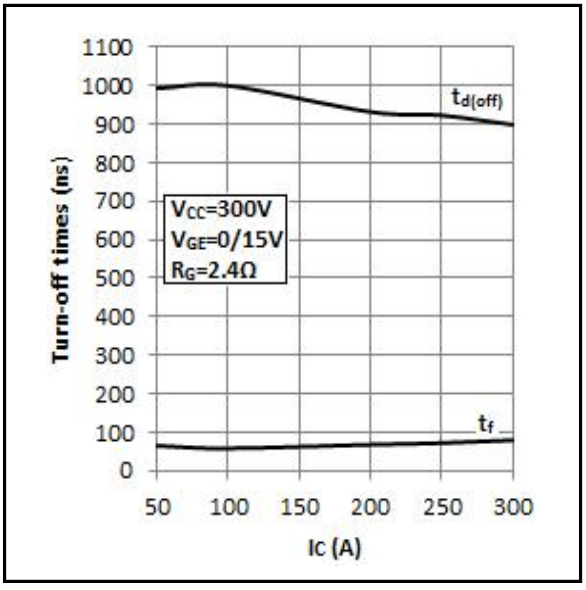


Figure 5: Typical IGBT switching losses vs R_G, T_j = 25 °C

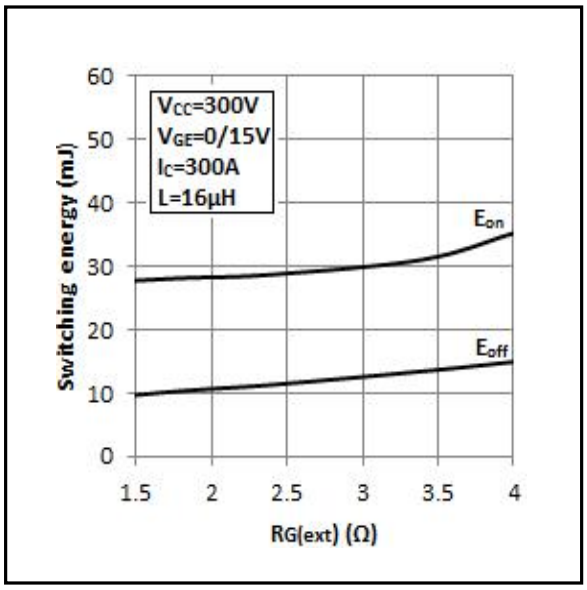
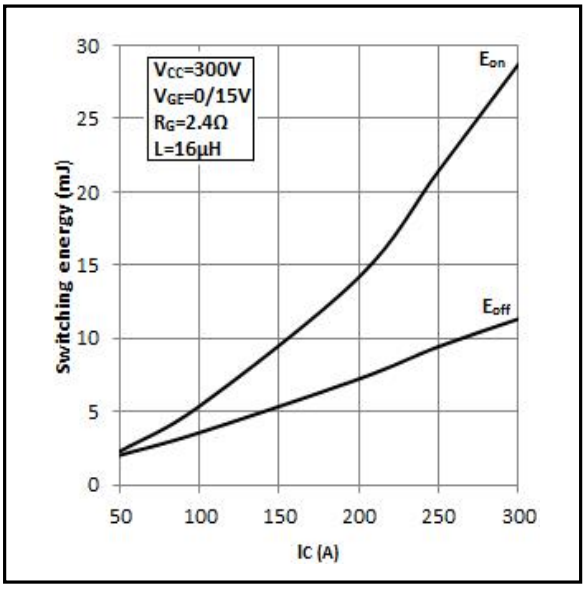
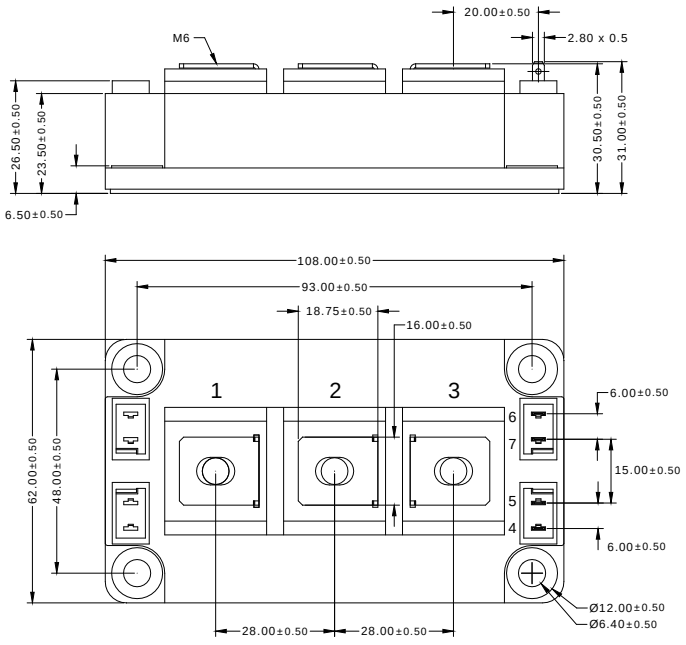


Figure 6: Typical IGBT switching losses vs I_C, T_j = 25 °C



Package Outline Drawing



CAUTION: These devices are ESD sensitive. Use proper handling procedure.

Disclaimer

These specifications may not be considered as a guarantee of components characteristics. Components have to be tested depending on intended application as adjustments may be necessary. The use of **iQXPRZ Power Inc.** components in life support appliances and systems are subject to written approval of **iQXPRZ Power Inc.**

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