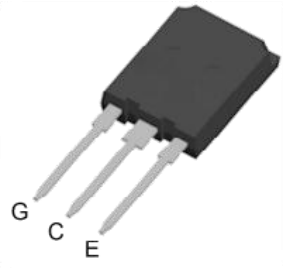
1200V 100A CoolFAST™ 7 Technology IGBT

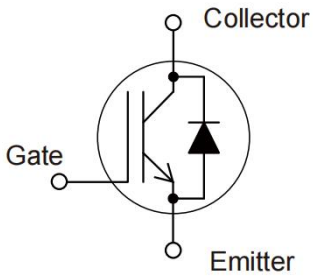
Features:

- Low Switching Power Loss
- Low Switching Surge and Noise
- Advanced Field Stop Technology
- Low EMI
- Maximum Junction Temperature 175°C
- Qualified According to JEDEC For Target Applications
- Pb-free Lead Plating, Halogen-free Mold Compound, RoHS Compliant



Applications:

- Industrial UPS
- Welding Machine
- Solar Converters
- EV Charger



Key Performance and Package Parameters

Type	V_{CE}	I_C	V_{CEsat}, T_{vj}=25°C	T_{vjmax}	Marking	Package
DKQ100N120FX7	1200V	100A	1.8 V	175°C	DKQ100N120FX7	TO-247PLUS-3L

Maximum Ratings and Characteristics

Absolute Maximum Ratings at T_{vj}= 25°C (unless otherwise specified)

Items	Symbols	Value	Units
Collector-emitter voltage	V_{CES}	1200	V
Gate-emitter voltage Transient gate-emitter voltage (t_p≤ 10μs, D< 0.010)	V_{GES}	±20 ±30	V
DC collector current, limited by T_{vjmax} T_C= 25°C T_C= 100°C	I_C	 140 100	A
Pulsed collector current, t_p limited by T_{vjmax}	I_{CP}	400	A
Diode forward current, limited by T_{vjmax} T_C= 25°C T_C= 100°C	I_F	 140 100	A
Diode Pulsed collector current, t_p limited by T_{vjmax}	I_{FP}	400	A
Short circuit withstand time, V_{GE}= 15V, V_{CE}≤ 600V	T_{SC}	5	μs
Operating junction temperature	T_{vj}	-40 ~ +175	°C
Storage temperature	T_{stg}	-55 ~ +175	°C

Electrical Characteristics at T_{vj}= 25°C (unless otherwise specified)

Description	Symbols	Conditions	Characteristics			Unit
			Min	Typ	Max	
Collector-emitter breakdown voltage	$V_{(BR)CES}$	V_{GE}= 0V, I_C= 0.25mA	1200	-	-	V
Zero gate voltage collector current	I_{CES}	V_{CE}= 1200V, V_{GE}= 0V	-	-	200	μA
Gate-emitter leakage current	I_{GES}	V_{CE}= 0V, V_{GE}= ±20V	-	-	±200	nA
Gate-emitter threshold voltage	$V_{GE(th)}$	V_{CE}= V_{GE}, I_C= 100mA	6.0	6.6	7.2	V
Collector-emitter saturation voltage	$V_{CE(sat)}$	V_{GE}= 15V, I_C= 100A T_{vj}= 25°C T_{vj}= 175°C	 - -	 1.8 2.0	 2.2 	V
Input capacitance	C_{ies}	V_{CE}= 25V, V_{GE}= 0V f= 1MHz	-	25	-	nF
Output capacitance	C_{oes}		-	220	-	pF
Reverse transfer capacitance	C_{res}		-	130	-	pF
Gate charge	Q_G	V_{CC}= 960V, I_C= 100A, V_{GE}= 15V	-	950	-	nC
Forward voltage drop	V_F	I_F= 100A T_{vj}= 25°C T_{vj}= 175°C	 - -	 2.2 1.9	 3.0 	V

Switching Characteristics at T_{vj}= 25°C

Description	Symbols	Conditions	Characteristics			Unit
			Min	Typ	Max	
IGBT Characteristics						
Turn-on delay time	$t_{d(on)}$	V_{CC}= 600V I_C= 100A V_{GE}= 15V R_G= 10Ω Inductive load	-	212	-	ns
Rise time	t_r		-	87	-	ns
Turn-off delay time	$t_{d(off)}$		-	534	-	ns
Fall time	t_f		-	170	-	ns
Turn-on energy	E_{on}		-	8.6	-	mJ
Turn-off energy	E_{off}		-	5.3	-	mJ
Total switching energy	E_{ts}		-	13.9	-	mJ
Diode Characteristics						
Diode reverse recovery time	t_{rr}	V_{CC}= 600V I_F= 100A di_F/dt= 896A/μs	-	369	-	ns
Diode reverse recovery charge	Q_{rr}		-	4.99	-	μC
Diode peak reverse recovery current	I_{rrm}		-	31.8	-	A

Thermal Resistance

Items	Symbols	Characteristics			Unit
		Min	Typ	Max	
Thermal resistance, junction-ambient	$R_{th(j-a)}$	-	-	50	°C /W
Thermal resistance, IGBT junction to case	$R_{th(j-c)}$	-	-	0.2	
Thermal resistance, diodes junction to case	$R_{th(j-c)}$	-	-	0.3	

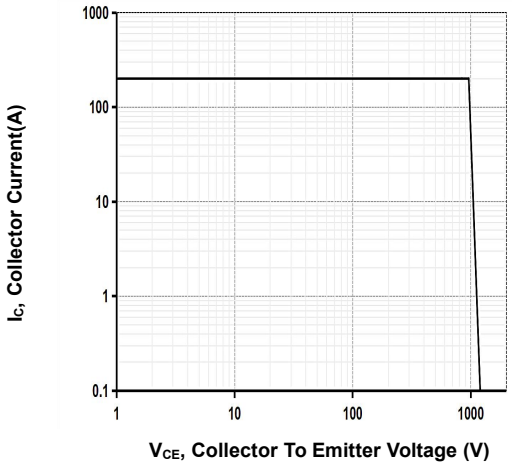


Figure 1. Reverse bias safe operating area
(D= 0, T_C= 25°C, T_{vj}≤ 175°C; V_{GE}= 15V)

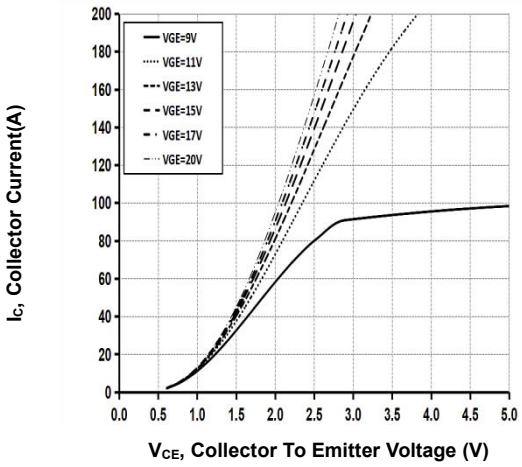


Figure 2. Typical output characteristic
(T_{vj}= 150°C)

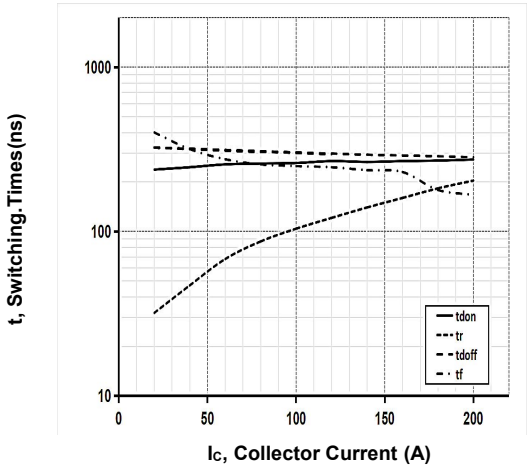


Figure 3. Typical switching times vs. collector current (Ind. load, T_{vj}= 150°C, V_{CE}= 600V, V_{GE}= 15/0V, R_G=10Ω)

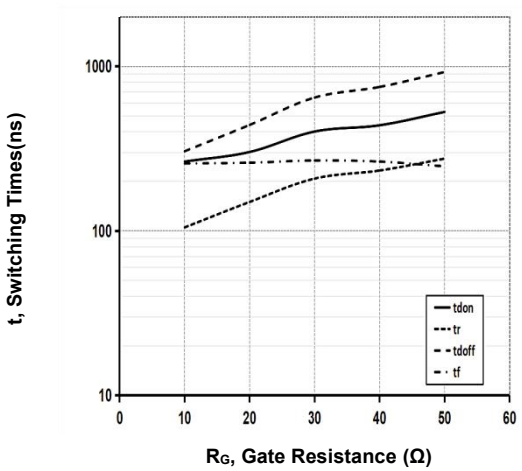


Figure 4. Typical switching times vs. gate resistor
(Ind. Load, T_{vj}= 150°C, V_{CE}= 600V, V_{GE}= 15/0V, I_C= 100A)

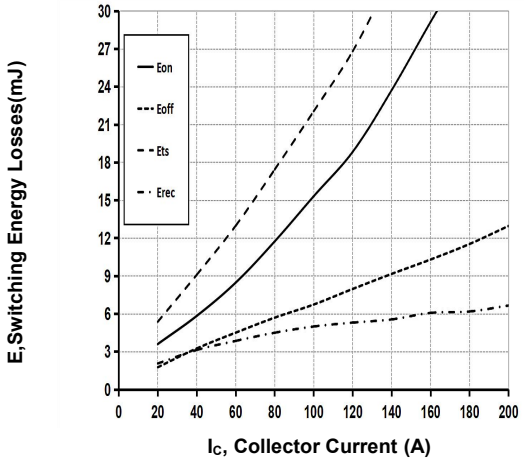


Figure 5. Typical switching energy losses vs. collector current (Ind. load, T_{vj}= 150°C, V_{CE}= 600V, V_{GE}= 15/0V, R_G=10Ω)

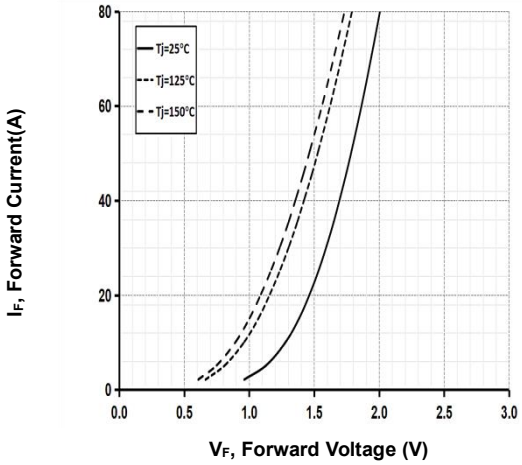


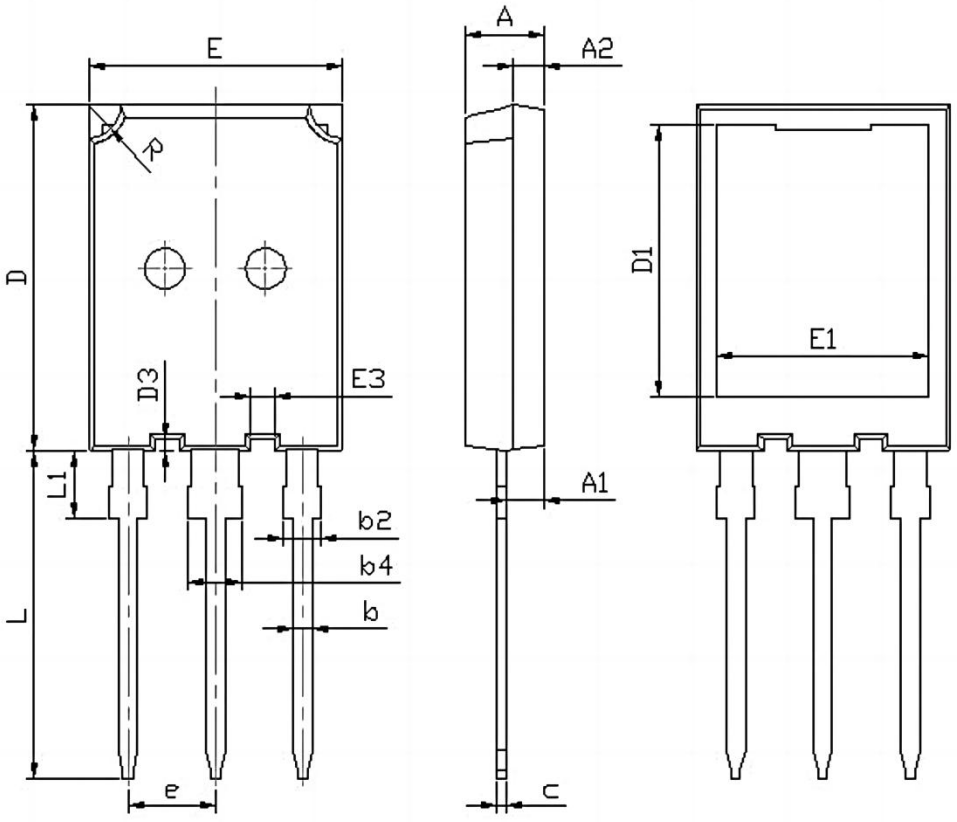
Figure 6. Typical diode forward current vs. forward voltage

TO-247PLUS-3 Package Outline

TO-247plus-3L MECHANICAL DATA

UNIT: mm

SYMBOL	MIN	NOM	MAX	SYMBOL	MIN	NOM	MAX
A	4.80	5.00	5.20	D3	0.53	0.68	0.83
A1	2.21	2.40	2.61	E	15.50	15.80	16.10
A2	1.85		2.15	E1	13.10	13.30	13.50
b	1.07	1.20	1.33	E3	1.30	1.45	1.60
b2	1.90		2.16	e		5.44	
b4	2.90		3.20	L	19.62	19.92	20.22
c	0.52	0.60	0.68	L1			4.30
D	20.70	21.00	21.30	R	1.85	2.00	2.15
D1	16.25	16.55	16.85				



Revision History

Revision	Date	Subjects (major changes since last revision)
0.1	2024-03-27	Preliminary version
0.2	2024-05-10	Preliminary version

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