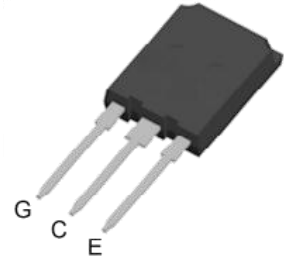


## 1200V 150A CoolFAST™ 7 Technology IGBT

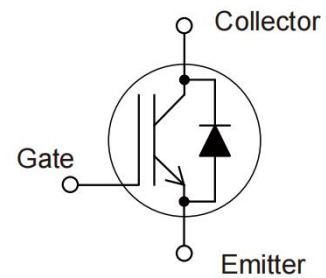
### Features:

- 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 <sub>CE</sub>	I <sub>C</sub>	V <sub>CEsat</sub> , T <sub>vj</sub> =25°C	T <sub>vjmax</sub>	Marking	Package
DKQ150N120VX7	1200V	150A	2.0 V	175°C	DKQ150N120VX7	TO-247PLUS-3L

### Maximum Ratings and Characteristics

#### Absolute Maximum Ratings at T<sub>vj</sub>= 25°C (unless otherwise specified)

Items	Symbols	Value	Units
Collector-emitter voltage	V <sub>CES</sub>	1200	V
Gate-emitter voltage	V <sub>GES</sub>	±20	V
Transient gate-emitter voltage (t <sub>p</sub> ≤ 10μs, D < 0.010)		±30	
DC collector current, limited by T <sub>vjmax</sub>	I <sub>C</sub>	175	A
T <sub>C</sub> = 25°C		150	
T <sub>C</sub> = 100°C	I <sub>CP</sub>	600	A
Pulsed collector current, t <sub>p</sub> limited by T <sub>vjmax</sub>	I <sub>F</sub>	180	A
Diode forward current, limited by T <sub>vjmax</sub>		150	
T <sub>C</sub> = 25°C	I <sub>FP</sub>	600	A
T <sub>C</sub> = 100°C	T <sub>SC</sub>	10	μs
Diode Pulsed collector current, t <sub>p</sub> limited by T <sub>vjmax</sub>	T <sub>vj</sub>	-40 ~ +175	°C
Short circuit withstand time, V <sub>GE</sub> = 15V, V <sub>CE</sub> ≤ 600V	T <sub>stg</sub>	-55 ~ +175	°C
Operating junction temperature			
Storage temperature			

## Electrical Characteristics at $T_{vj}= 25^{\circ}\text{C}$ (unless otherwise specified)

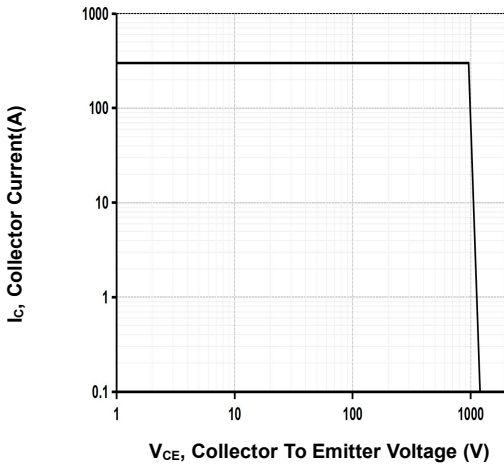
Description	Symbols	Conditions	Characteristics			Unit
			Min	Typ	Max	
Collector-emitter breakdown voltage	$V_{(BR)CES}$	$V_{GE}= 0\text{V}, I_C= 0.25\text{mA}$	1200	-	-	V
Zero gate voltage collector current	$I_{CES}$	$V_{CE}= 1200\text{V}, V_{GE}= 0\text{V}$	-	-	200	$\mu\text{A}$
Gate-emitter leakage current	$I_{GES}$	$V_{CE}= 0\text{V}, V_{GE}= \pm 20\text{V}$	-	-	$\pm 200$	nA
Gate-emitter threshold voltage	$V_{GE(th)}$	$V_{CE}= V_{GE}, I_C= 150\text{mA}$	6.0	6.6	7.2	V
Collector-emitter saturation voltage	$V_{CE(sat)}$	$V_{GE}= 15\text{V}, I_C= 150\text{A}$	-	2.0	2.4	V
		$T_{vj}= 25^{\circ}\text{C}$ $T_{vj}= 175^{\circ}\text{C}$	-	2.2		
Input capacitance	$C_{ies}$	$V_{CE}= 25\text{V}, V_{GE}= 0\text{V}$ $f= 1\text{MHz}$	-	40	-	nF
Output capacitance	$C_{oes}$		-	330	-	pF
Reverse transfer capacitance	$C_{res}$		-	195	-	pF
Gate charge	$Q_G$	$V_{CC}= 960\text{V}, I_C= 150\text{A}, V_{GE}= 15\text{V}$	-	1450	-	nC
Forward voltage drop	$V_F$	$I_F= 150\text{A}$	-	3.5	4.0	V
		$T_{vj}= 25^{\circ}\text{C}$ $T_{vj}= 175^{\circ}\text{C}$	-	6.8		

## Switching Characteristics at $T_{vj}= 25^{\circ}\text{C}$

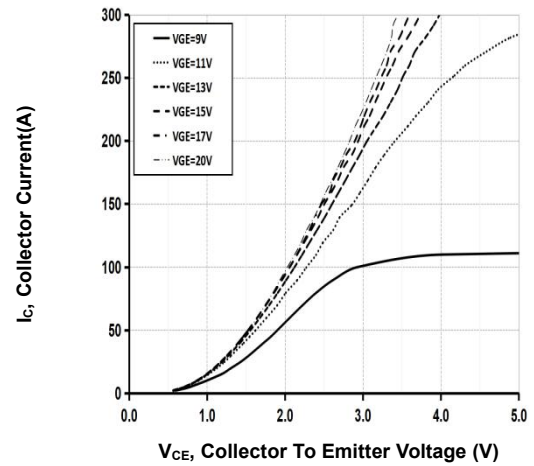
Description	Symbols	Conditions	Characteristics			Unit
			Min	Typ	Max	
<b>IGBT Characteristics</b>						
Turn-on delay time	$t_{d(on)}$	$V_{CC}= 600\text{V}$ $I_C= 150\text{A}$ $V_{GE}= 15\text{V}$ $R_G= 10\Omega$ Inductive load	-	350	-	ns
Rise time	$t_r$		-	140	-	ns
Turn-off delay time	$t_{d(off)}$		-	360	-	ns
Fall time	$t_f$		-	160	-	ns
Turn-on energy	$E_{on}$		-	14.5	-	mJ
Turn-off energy	$E_{off}$		-	7.9	-	mJ
Total switching energy	$E_{ts}$		-	22.4	-	mJ
<b>Diode Characteristics</b>						
Diode reverse recovery time	$t_{rr}$	$V_{CC}= 600\text{V}$	-	63	-	ns
Diode reverse recovery charge	$Q_{rr}$	$I_F= 150\text{A}$	-	0.31	-	$\mu\text{C}$
Diode peak reverse recovery current	$I_{rrm}$	$di_F/dt= 803\text{A}/\mu\text{s}$	-	11	-	A

## Thermal Resistance

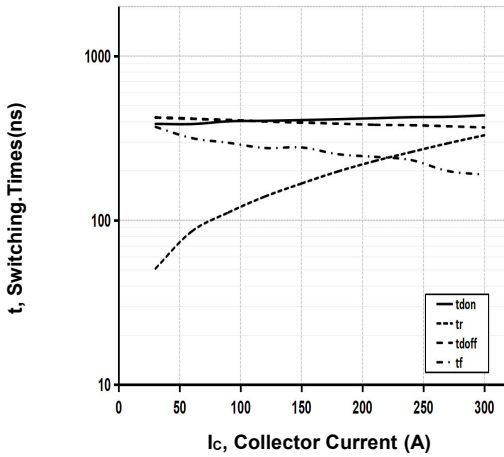
Items	Symbols	Characteristics			Unit
		Min	Typ	Max	
Thermal resistance, junction-ambient	$R_{th(j-a)}$	-	-	50	$^{\circ}\text{C} / \text{W}$
Thermal resistance, IGBT junction to case	$R_{th(j-c)}$	-	-	0.2	
Thermal resistance, diodes junction to case	$R_{th(j-c)}$	-	-	0.3	



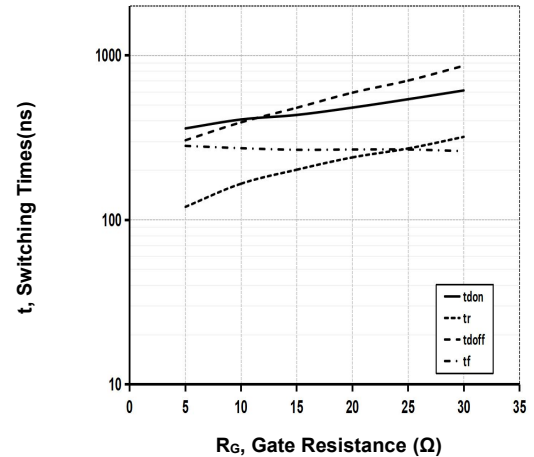
**Figure 1. Reverse bias safe operating area**  
( $D=0$ ,  $T_C=25^\circ\text{C}$ ,  $T_{vj}\leq 150^\circ\text{C}$ ;  $V_{GE}=15\text{V}$ )



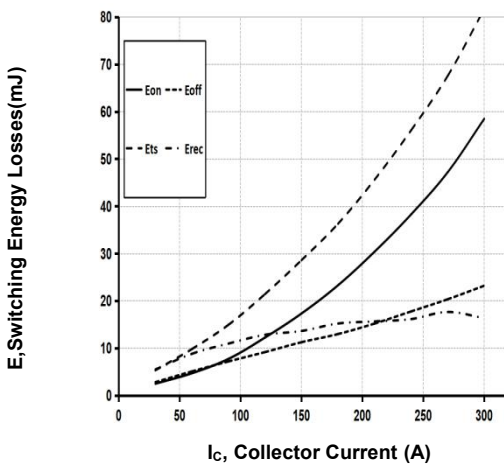
**Figure 2. Typical output characteristic**  
( $T_{vj}=150^\circ\text{C}$ )



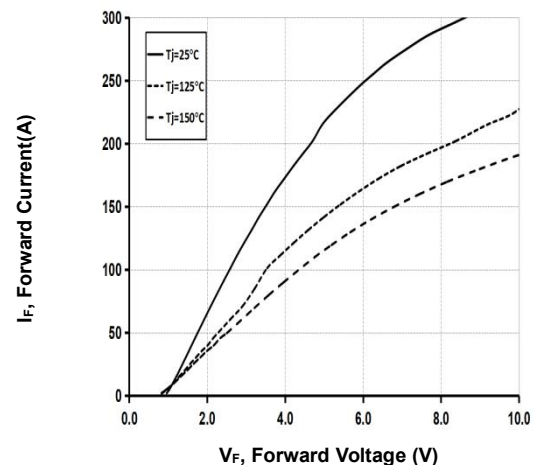
**Figure 3. Typical switching times vs. collector current**  
(Ind. load,  $T_{vj}=150^\circ\text{C}$ ,  $V_{CE}=600\text{V}$ ,  $V_{GE}=15/0\text{V}$ ,  $R_G=10\Omega$ )



**Figure 4. Typical switching times vs. gate resistor**  
(Ind. Load,  $T_{vj}=150^\circ\text{C}$ ,  $V_{CE}=600\text{V}$ ,  $V_{GE}=15/0\text{V}$ ,  $I_C=150\text{A}$ )



**Figure 5. Typical switching energy losses vs. collector current**  
(Ind. load,  $T_{vj}=150^\circ\text{C}$ ,  $V_{CE}=600\text{V}$ ,  $V_{GE}=15/0\text{V}$ ,  $R_G=10\Omega$ )



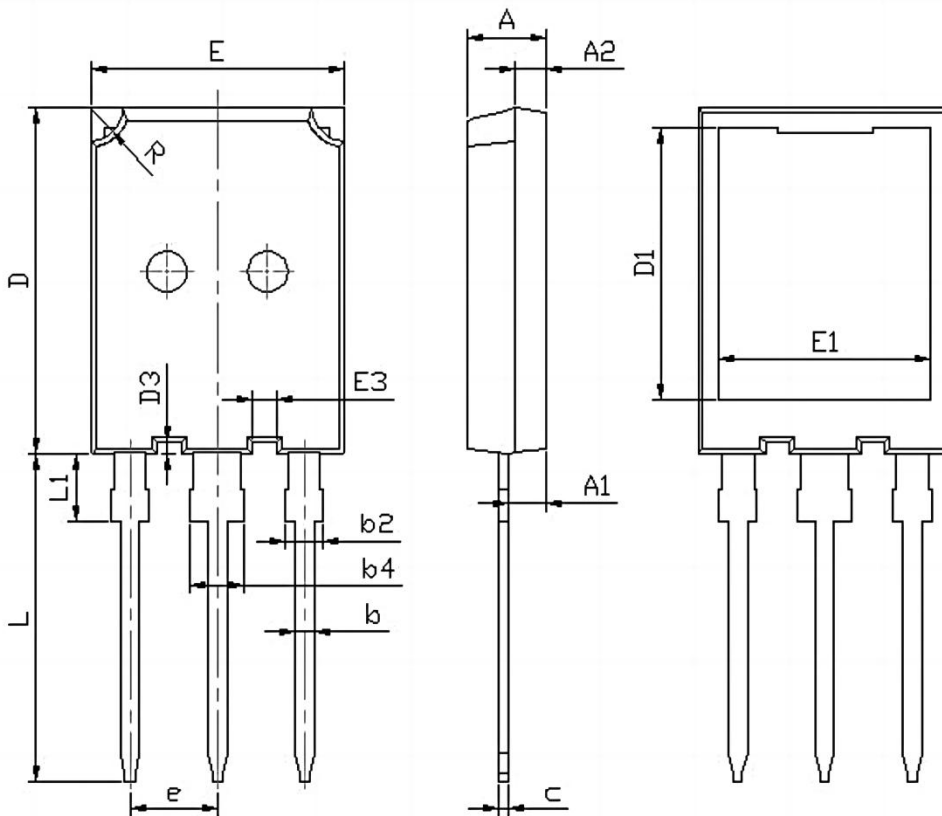
**Figure 6. Typical diode forward current vs. forward voltage**

## TO-247PLUS-3L Package Outline

### T0-247plus-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	2024-05-16	Preliminary version

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