

High Speed IGBT in Trench and Fieldstop Technology

Electrical Features:

- 1200V 150A, $V_{CE(sat)} = 1.7V@25^{\circ}C$
- High RBSOA Capability
- Trench/FS Technology
- Low Reverse-recovery Losses
- High SC Capability

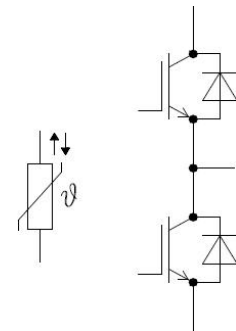


Applications:

- Motor Drives
- Solar Applications
- UPS Systems
- Commercial Electric Vehicles
- Wind Turbines

Mechanical Features:

- High Power and Thermal Cycling Capability
- High Power Density
- PressFIT Contact Technology
- Isolated Base Plate



Equivalent circuit

Key Performance and Package Parameters

Type	V_{CE}	I_C	$V_{CEsat}, T_{vj}=25^{\circ}C$	T_{vjmax}	Marking	Package
DKM150GB12X7T	1200V	150A	1.7V	150°C	DKM150GB12X7T	34mm

Maximum Ratings and Characteristics

Absolute Maximum Ratings at $T_c = 25^{\circ}C$ (unless otherwise specified)

Items	Symbols	Values	Units	Remarks
Collector-Emitter voltage	V_{CES}	1200	V	
Gate-Emitter voltage	V_{GES}	± 30	V	
DC Collector Current	I_C	150	A	$T_c = 100^{\circ}C$
Pulsed Collector Current	I_{CP}	300	A	Note *1
Diode Forward Current	I_F	150	A	
Short Circuit Withstand Time	T_{SC}	10	μs	$V_{CC} \leq 600V, V_{GE} = 15V$ $T_{vj} \leq 150^{\circ}C$
Operating Junction Temperature	T_{vj}	-40 ~ +150	$^{\circ}C$	
Storage Temperature	T_{stg}	-40 ~ +125	$^{\circ}C$	

Note *1 : Pulse width limited by T_{vjmax} .

Electrical characteristics (unless otherwise specified)

IGBT

Description	Symbols	Conditions		Values			Unit
				Min	Typ	Max	
Zero Gate Voltage Collector Current	I_{CES}	$V_{CE} = 1200V, V_{GE} = 0V$ $T_{vj} = 25^{\circ}C$				200	μA
Gate-Emitter Leakage Current	I_{GES}	$V_{CE} = 0V, V = 20V, T_{vj} = 25^{\circ}C$				± 300	nA
Gate-Emitter Threshold Voltage	$V_{GE(th)}$	$V_{CE} = V_{GE}, I_C = 150mA$		6.2	6.7	7.2	V
Collector-Emitter Saturation Voltage	$V_{CE(sat)}$	$V_{GE} = 15V$ $I_C = 150A$	$T_{vj} = 25^{\circ}C$		1.7	2.2	V
			$T_{vj} = 125^{\circ}C$		2.1		
			$T_{vj} = 150^{\circ}C$		2.2		
Input Capacitance	C_{ies}	$V_{CE} = 25V, V_{GE} = 0V$			40		nF
Reverse Transfer Capacitance	C_{res}	$f = 1MHz$			0.19		nF
Gate Charge	Q_G	$V_{CC} = 600V, V_{GE} = 15V$			1450		nC
Internal Gate Resistor	R_{Gint}	$T_{vj} = 25^{\circ}C$			2.8		Ω
Turn-On Delay Time, Inductive load	$t_{d(on)}$	$V_{CC} = 600V$ $I_C = 150A$ $V_{GE} = 15V$ $R_G = 10\Omega$	$T_{vj} = 25^{\circ}C$		0.36		μs
			$T_{vj} = 125^{\circ}C$		0.39		
			$T_{vj} = 150^{\circ}C$		0.40		
Rise Time, Inductive load	t_r		$T_{vj} = 25^{\circ}C$		0.13		μs
			$T_{vj} = 125^{\circ}C$		0.15		
			$T_{vj} = 150^{\circ}C$		0.16		
Turn-Off Delay Time, Inductive load	$t_{d(off)}$		$T_{vj} = 25^{\circ}C$		0.40		μs
			$T_{vj} = 125^{\circ}C$		0.44		
			$T_{vj} = 150^{\circ}C$		0.45		
Fall Time, Inductive load	t_f	$T_{vj} = 25^{\circ}C$		0.14		μs	
		$T_{vj} = 125^{\circ}C$		0.23			
		$T_{vj} = 150^{\circ}C$		0.25			
Turn-On Energy	E_{on}	$T_{vj} = 25^{\circ}C$		14.1		mJ	
		$T_{vj} = 125^{\circ}C$		20.9			
		$T_{vj} = 150^{\circ}C$		23.5			
Turn-Off Energy	E_{off}	$T_{vj} = 25^{\circ}C$		8.9		mJ	
		$T_{vj} = 125^{\circ}C$		11.1			
		$T_{vj} = 150^{\circ}C$		12.0			

Diode

Description	Symbols	Conditions	Values			Unit
			Min	Typ	Max	
Forward Voltage	V_F	$I_F = 150A, V_{GE} = 0V$	$T_{vj} = 25^\circ C$	2.04	2.7	V
			$T_{vj} = 125^\circ C$	1.62		
			$T_{vj} = 150^\circ C$	1.56		
Recovery Charge	Q_r	$I_F = 150A, V_R = 600V$ $-di_f/dt = 1200A/us$ $V_{GE} = -15V$	$T_{vj} = 25^\circ C$	5.07		μC
			$T_{vj} = 125^\circ C$	15.99		
			$T_{vj} = 150^\circ C$	19.33		
Reverse Recovery Energy	E_{rec}	$I_F = 150A, V_R = 600V$ $-di_f/dt = 1200A/us$ $V_{GE} = -15V$	$T_{vj} = 25^\circ C$	1.88		mJ
			$T_{vj} = 125^\circ C$	5.76		
			$T_{vj} = 150^\circ C$	6.89		

Thermal resistance

Items	Symbols	Values			Unit
		Min	Typ	Max	
Thermal Resistance, Per IGBT Junction to Case	$R_{th(j-c)}$			0.3	K/W
Thermal Resistance, Per Diodes Junction to Case	$R_{th(j-c)}$			0.4	

Module

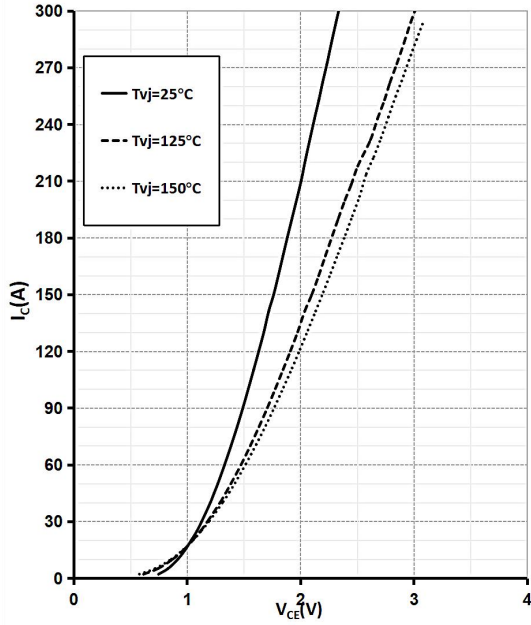
Description	Symbols	Conditions	Values	Unit
Isolation Test Voltage	V_{ISOL}	RMS, $f = 50Hz, t = 1min$	4.0	KV
Material of Module Base plat			Cu	
Internal Isolation			Al_2O_3	
Creepage Distance	d_{Creep}	Terminal to terminal	20.1	mm
Clearance	d_{Clear}	Terminal to terminal	9.5	mm
Comparative Tracking Index	CTI		200	

Description	Symbols	Conditions	Values			Unit
			Min	Typ	Max	
Stray Inductance Module	L_{sCE}			29.2		nH
Module Lead Resistance , Terminals-Chip	$R_{CC'+EE'}$	$T_C = 25^\circ C, \text{ Per switch}$		0.66		$m\Omega$
Mounting Torque for Module Mounting	M	Screw M5	3.0		5.0	Nm
Weight	G			156		g

Output characteristic (typical), IGBT, Inverter

$I_C = f(V_{CE})$

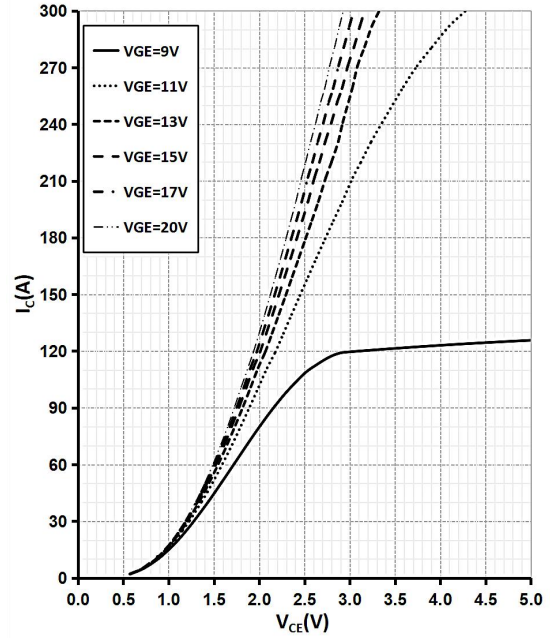
$V_{GE} = 15V$



Output characteristic (typical), IGBT, Inverter

$I_C = f(V_{CE})$

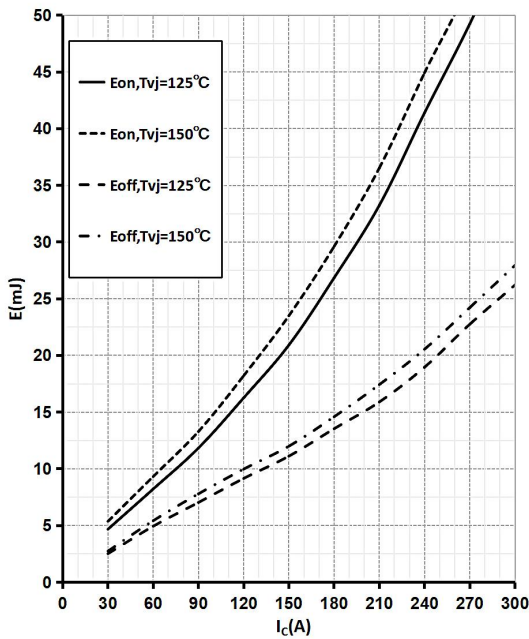
$T_{vj} = 150^{\circ}C$



Switching losses (typical), IGBT, Inverter

$E = f(I_C)$

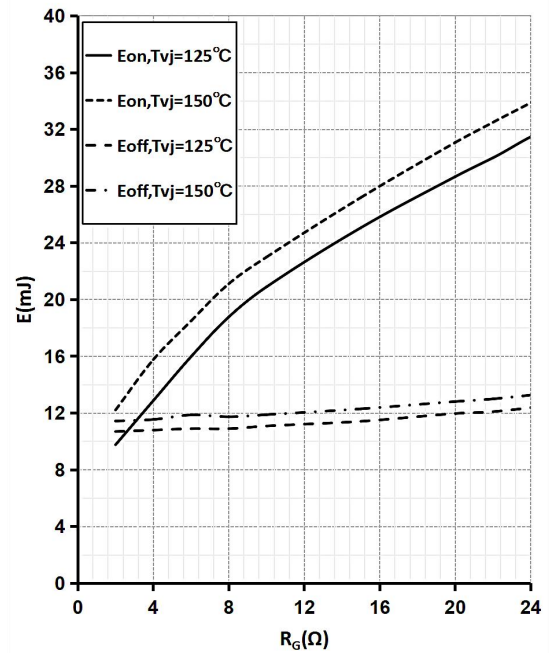
$R_{Goff} = 10\Omega, R_{Gon} = 10\Omega, V_{GE} = \pm 15V, V_{CC} = 600V$



Switching losses (typical), IGBT, Inverter

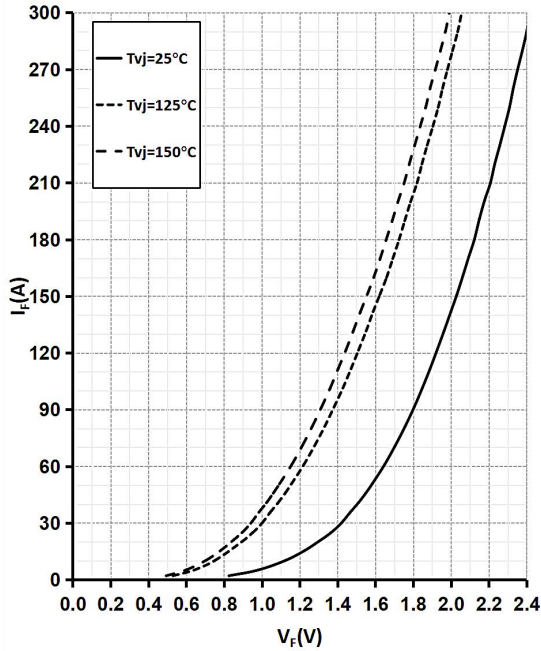
$E = f(R_G)$

$V_{GE} = 15V, I_C = 150A, V_{CC} = 600V$



Forward characteristic (typical), Diode, Inverter

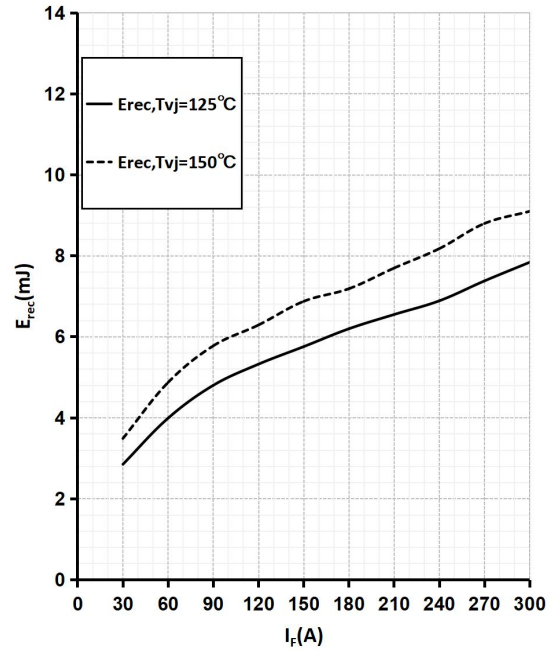
$I_F = f(V_F)$



Switching losses (typical), Diode, Inverter

$E_{rec} = f(I_F)$

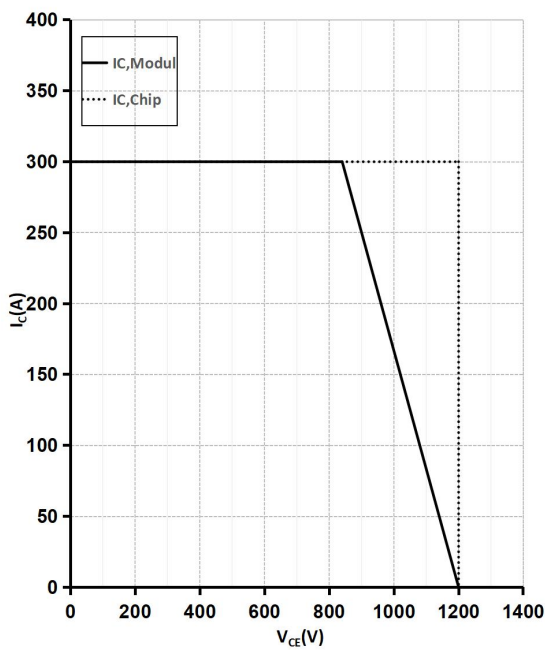
$R_{Gon} = 10\Omega, V_{CC} = 600V$



Reverse bias safe operating area (RBSOA), IGBT, Inverter

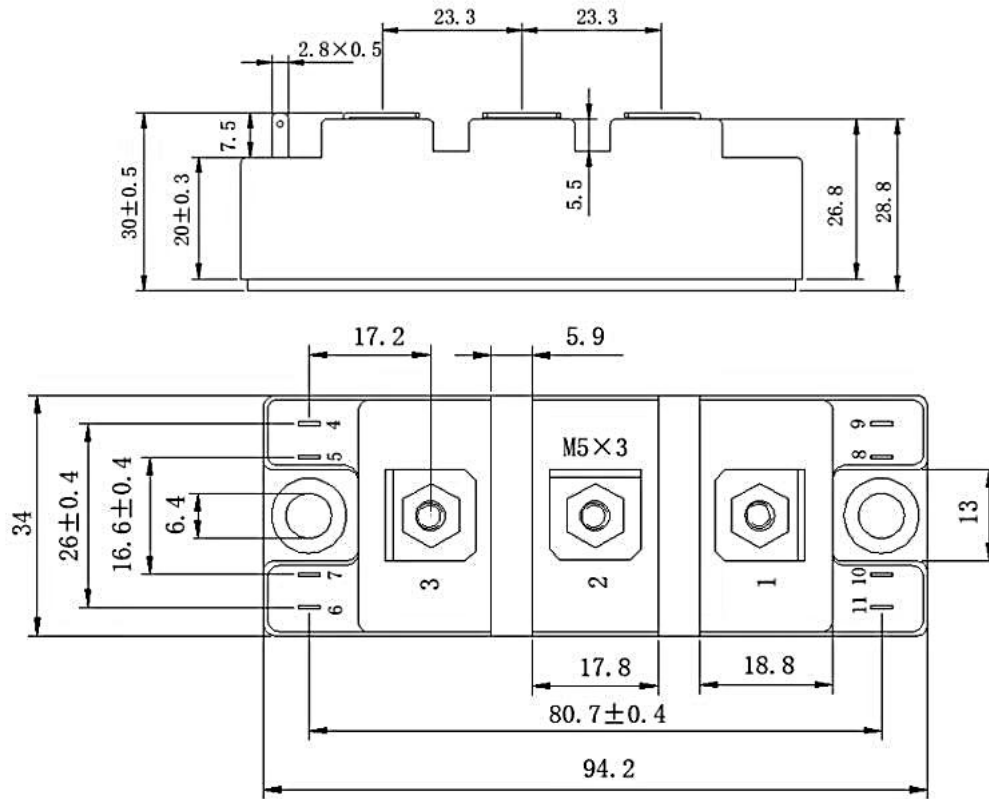
$I_C = f(V_{CE})$

$R_{Goff} = 10\Omega, V_{GE} = \pm 15V, T_{vj} = 150^\circ\text{C}$

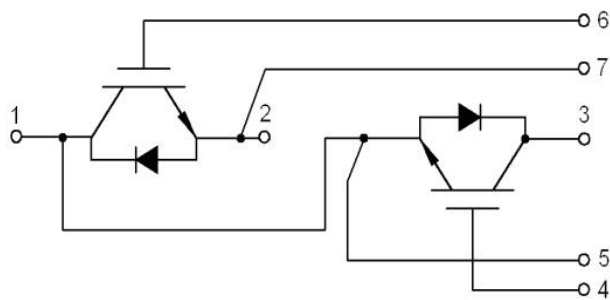


Package Dimension

Dimensions in Millimeters



Internal Circuit



Revision History

Revision	Date	Subjects (major changes since last revision)
0.1	2024-04-10	Preliminary version

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