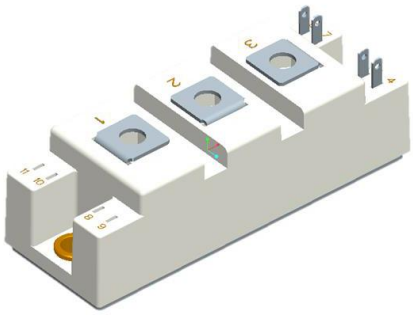
JJMICROELECTRONICS

34mm Module with 1200V 150A Trench FS IGBT

JA150Z12TH1

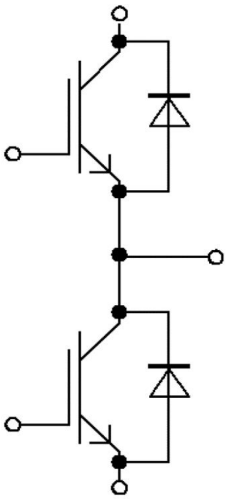
Key performance:

- V_{CE}=1200V
- I_C=150A@T_C=100℃
- $V_{CE(sat)}$=1.6V



Features:

- Low V_{CEsat}.
- Low switching losses.
- Low stray inductance design.
- Positive V_{CEsat} temperature coefficient.



Benefits:

- High efficiency for application.
- Excellent current sharing in parallel operation.
- RoHS compliant.

Applications:

- Welding machine
- High frequency switching converters

Maximum rated values , IGBT

Parameter	Conditions	Symbol	Values	Unit
Collector-emitter voltage	T_{vj} = 25°C	V_{CES}	1200	V
Continuous collector current	T_C = 100°C, $T_{vj\ max}$ = 175°C	I_C	150	A
Repetitive peak collector current	t_P = 1 ms	I_{CRM}	300	A
Total power dissipation	T_C = 25°C, $T_{vj\ max}$ = 175°C	P_{tot}	680	W
Gate-emitter peak voltage		V_{GES}	±20	V

Characteristic values , IGBT

Parameter	Conditions		Symbol	Values			Unit
				Min.	Typ.	Max.	
Collector-emitter saturation voltage	I_C = 150A,V_{GE} = 15 V	T_{vj} = 25°C T_{vj} = 125°C T_{vj} = 150°C	V_{CEsat}	-	1.60 1.80 1.85	-	V
Gate threshold voltage	I_C = 1 mA, V_{CE} = V_{GE} , T_{vj} = 25°C		V_{GEth}	-	5.8	-	V
Gate charge	V_{GE} = -15 / 15 V		Q_G	-	1.2	-	µC
Input capacitance	f = 100KHz, T_{vj} = 25°C, V_{CE} = 25 V, V_{GE} = 0 V		C_{ies}	-	14.9	-	nF
Reverse transfer capacitance			C_{res}	-	133	-	pF
Collector-emitter leakage current	V_{CE} = 1200 V, V_{GE} = 0 V, T_{vj} = 25°C		I_{CES}	-	-	1.0	mA
Gate-emitter leakage current	V_{CE} = 0 V, V_{GE} = 20 V, T_{vj} = 25°C		I_{GES}	-	-	500	nA
Turn-on delay time, inductive load	I_C = 150A V_{CE} = 600V V_{GE} = -15 / 15 V R_G = 5.1Ω	T_{vj} = 25°C T_{vj} =125°C T_{vj} =150°C	$t_{d(on)}$	-	223 263 281	-	ns
Rise time, inductive load		T_{vj} = 25°C T_{vj} =125°C T_{vj} =150°C	t_r	-	128 141 149	-	ns
Turn-off delay time, inductive load		T_{vj} = 25°C T_{vj} =125°C T_{vj} =150°C	$t_{d(off)}$	-	412 464 486	-	ns
Fall time, inductive load		T_{vj} = 25°C T_{vj} =125°C T_{vj} =150°C	t_f	-	83 112 135	-	ns

Turn-on energy loss per pulse	I_C = 150A V_{CE} = 600V V_{GE} = -15 / 15 V R_G = 5.1Ω	T_{vj} = 25°C T_{vj} =125°C T_{vj} =150°C	E_{on}	-	22.3 30.7 33.7	-	mJ
Turn-off energy loss per pulse		T_{vj} = 25°C T_{vj} =125°C T_{vj} =150°C	E_{off}	-	8.2 11.5 13.1	-	mJ
Thermal resistance, junction to case	per IGBT		R_{thJC}	-	-	0.22	K/W
Thermal resistance, case to heatsink	per IGBT		R_{thCH}	-	0.04	-	K/W
Temperature under switching conditions			$T_{vj\ op}$	-40	-	150	°C

Maximum rated values , Diode

Parameter	Conditions	Symbol	Values	Unit
Repetitive peak reverse voltage	T_{vj} = 25°C	V_{RRM}	1200	V
Continuous DC forward current		I_F	150	A
Repetitive peak forward current	t_P = 1 ms	I_{FRM}	300	A

Characteristic values , Diode

Parameter	Conditions		Symbol	Values			Unit
				Min.	Typ.	Max.	
Forward voltage	I_F = 150A, V_{GE} = 0 V	T_{vj} = 25°C T_{vj} = 125°C T_{vj} = 150°C	V_F	-	1.85 1.65 1.60	-	V
Peak reverse recovery current	I_F = 150 A V_R = 600V V_{GE}= -15V R_G = 5.1Ω - d_{iF}/d_t = 1000A/µs	T_{vj} = 25°C T_{vj} = 125°C T_{vj} = 150°C	I_{RR}	-	51 72 78	-	A
Recovered charge		T_{vj} = 25°C T_{vj} = 125°C T_{vj} = 150°C	Q_{RR}	-	6.1 14.5 17.6	-	µC
Reverse recovery energy		T_{vj} = 25°C T_{vj} = 125°C T_{vj} = 150°C	E_{rec}	-	1.74 4.17 5.07	-	mJ
Thermal resistance, junction to case	per diode		R_{thJC}	-	-	0.45	K/W
Thermal resistance, case to heatsink	per diode		R_{thCH}	-	0.08	-	K/W
Temperature under switching conditions			$T_{vj\ op}$	-40	-	150	°C

Module characteristic values

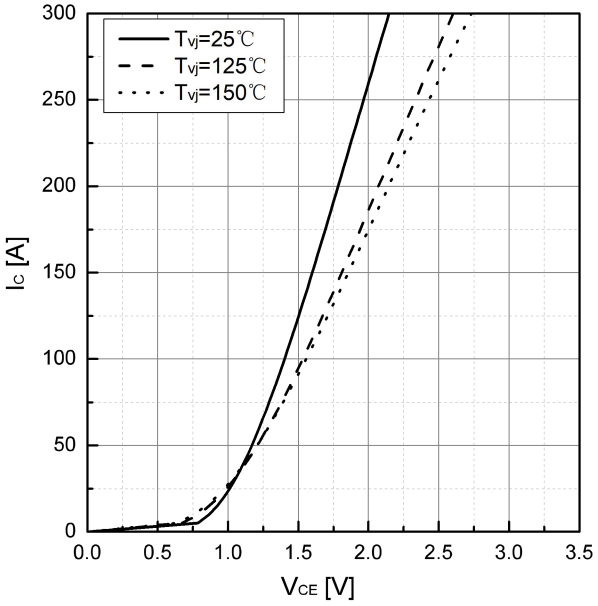
Parameter	Conditions	Symbol	Values	Unit
Isolation test voltage	RMS, f = 50 Hz, t = 1 min.	V_{ISOL}	2.5	kV
Internal isolation	basic insulation (class 1, IEC 61140)		Al_2O_3	
Creepage distance	terminal to heatsink terminal to terminal		17 20	mm
Clearance	terminal to heatsink terminal to terminal		17 9.5	mm
Comperative tracking index		CTI	> 200	

Parameter	Conditions	Symbol	Values			Unit
			Min.	Typ.	Max.	
Stray inductance module		L_{sCE}	-	35	-	nH
Module lead resistance, terminals - chip	T_C = 25°C, per switch	$R_{CC'+EE'}$	-	0.7	-	mΩ
Storage temperature		Tstg	-40	-	125	°C
Mounting torque	Screw:M6	M	3	-	5	Nm
Terminal connection torque	Screw:M5	M	2.5	-	5	Nm
Weight		G	-	164	-	g

Output characteristic, IGBT

$I_C=f(V_{CE})$

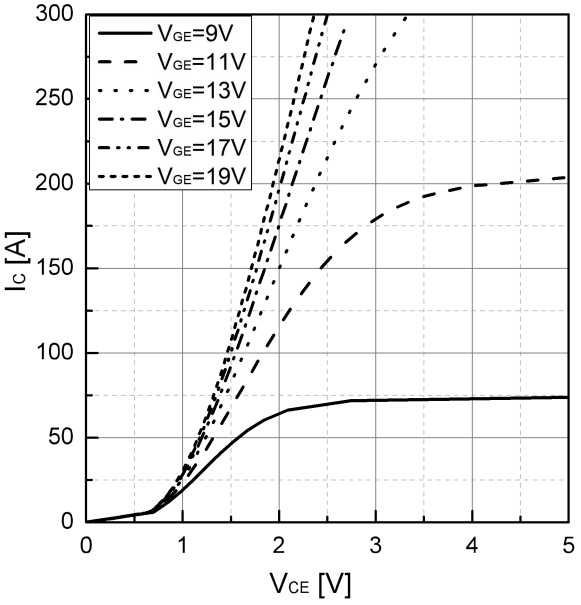
$V_{GE}=15V$



Output characteristic, IGBT

$I_C=f(V_{CE})$

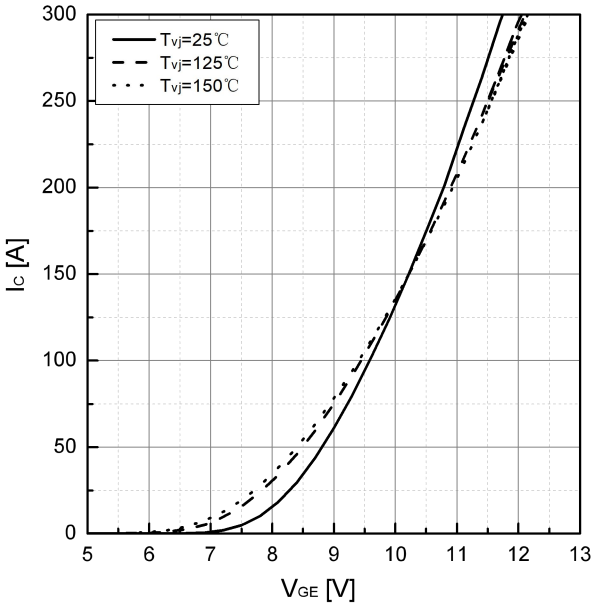
$T_{vj}=150°C$



Transfer characteristic, IGBT

$I_C=f(V_{CE})$

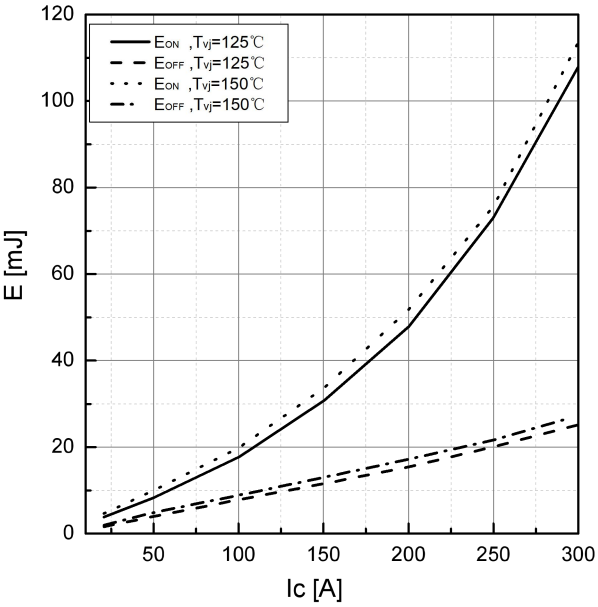
$V_{CE}=20V$



Switching losses vs. I_C, IGBT

$E_{on}=f(I_C)$,$E_{off}=f(I_C)$

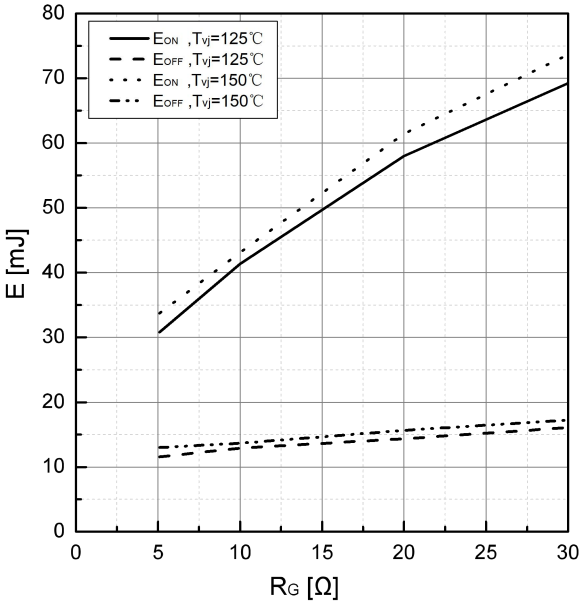
$V_{CE}=600V$, $V_{GE}=15/-15V$, $R_G=5.1\ \Omega$



Switching losses vs. R_G, IGBT

$E_{on}=f(R_G)$, $E_{off}=f(R_G)$

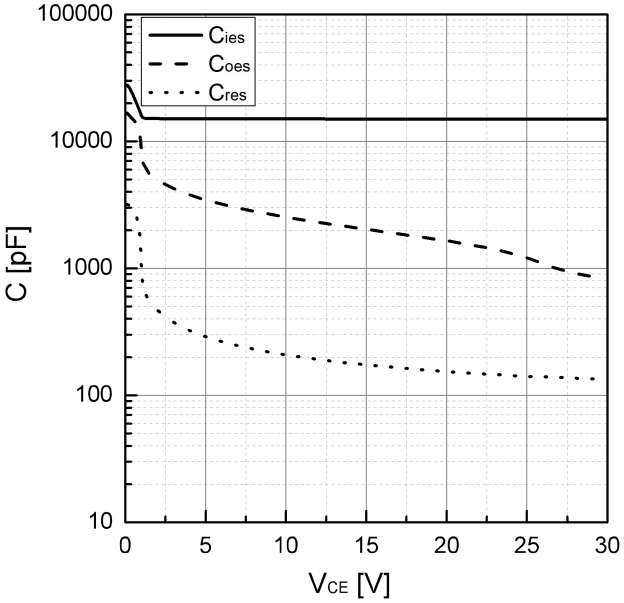
$V_{CE}=600V$, $V_{GE}=15/-15V$, $I_C=150A$



Capacity characteristic, IGBT

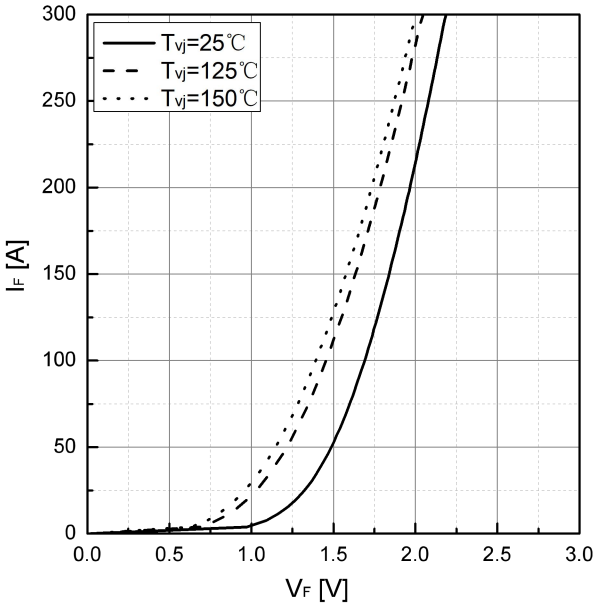
$C=f(V_{CE})$

$f=100KHz$, $V_{GE}=0V$, $T_{vj}=25℃$



Forward characteristic, Diode

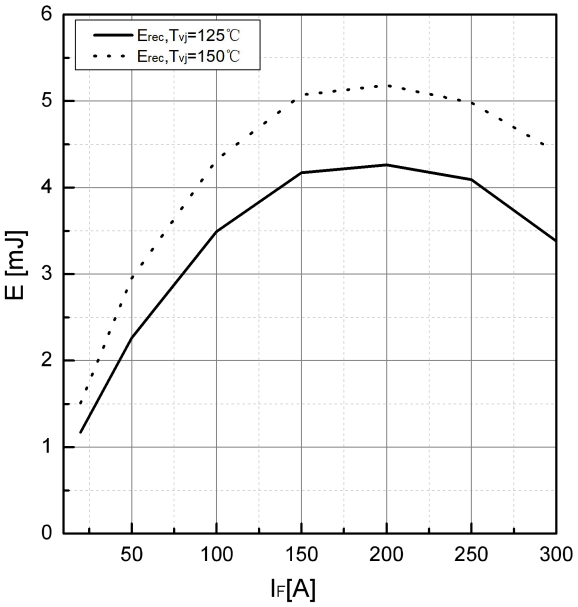
$I_F=f(V_F)$



Switching losses vs. I_F, Diode

$E_{rec}=f(I_F)$

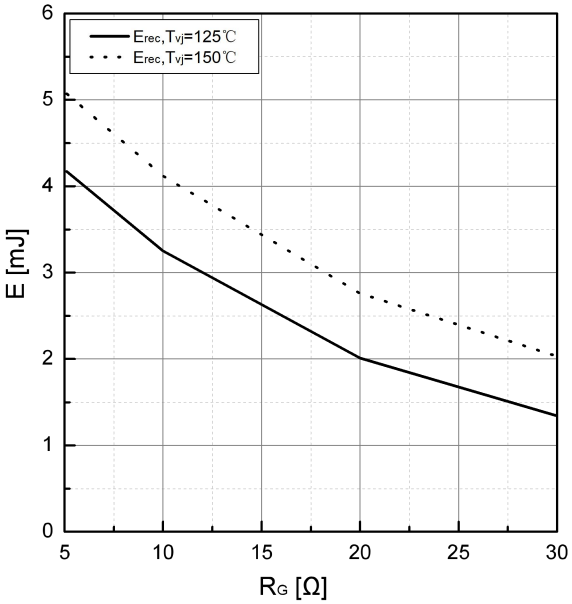
$V_R=600V$, $R_G=5.1\ \Omega$



Switching losses vs. R_G , Diode

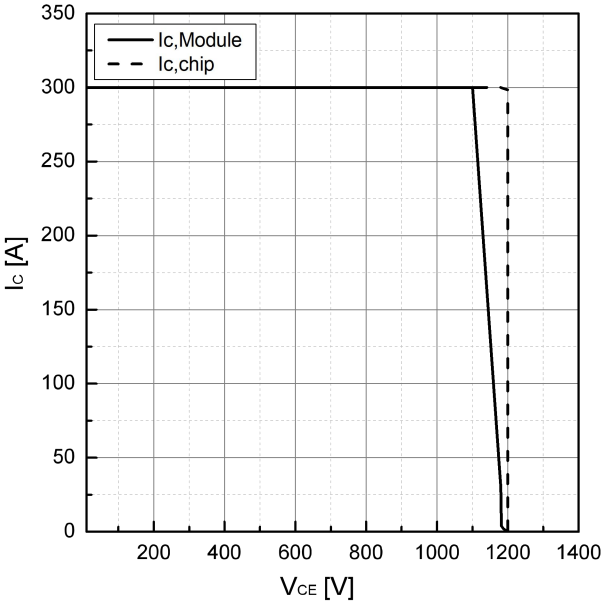
$E_{rec}=f(R_G)$

$V_R=600V$, $I_F=150A$

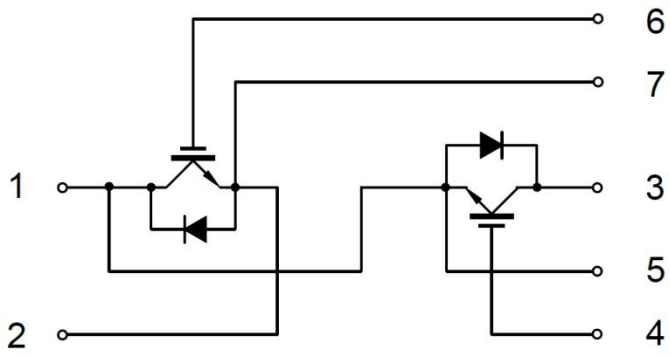


Reverse bias safe operating area (RBSOA)

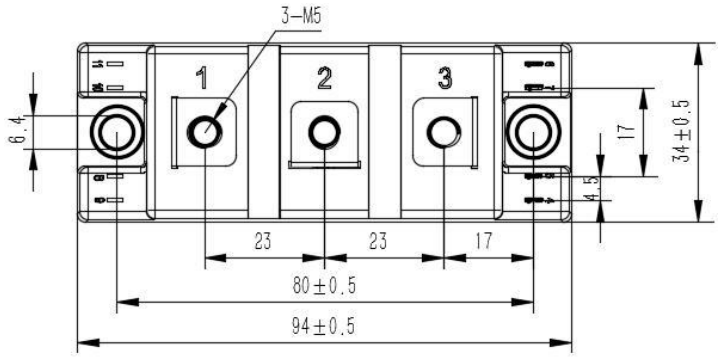
$V_{CE}=600V$, $V_{GE}=15/-15V$, $R_G=5.1\ \Omega$

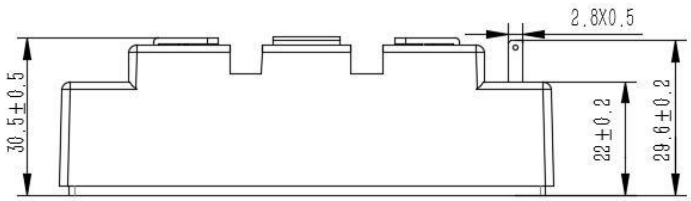


Circuit diagram



Package outlines (mm)





Revision history

Date	Revision	Changes
Oct 12, 2024	Rev 1.0	Release of the final datasheet.

Disclaimer