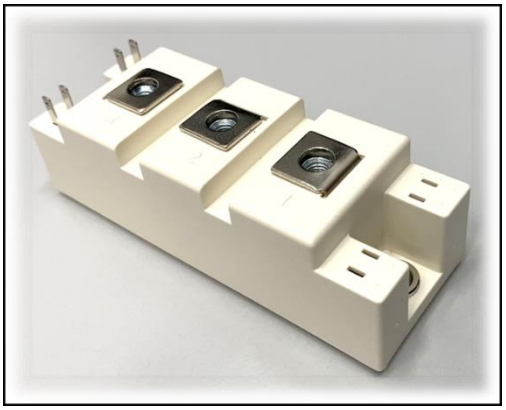
Features

- Low $V_{CE(sat)}$
- Fast Switching
- High Ruggedness
- Short-Circuit Rated

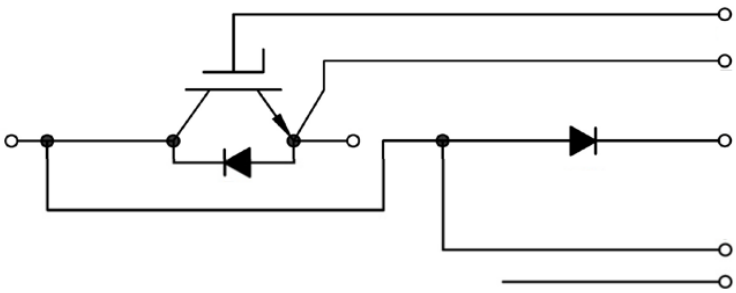
Product Summary	
V_{CES}	1200V
I_C	150A
$V_{CE(sat),typ}$	1.6V



Applications

- High Frequency Switching Application
- Industrial Motor Drives
- Medical Applications
- UPS Systems
- Servos

Internal Connection



• IGBT, Brake-Chopper

Absolute Maximum Ratings

Parameter	Symbol	Limit	Unit
Collector-to-Emitter Voltage	V_{CES}	1200	V
Gate-to-Emitter Voltage	V_{GES}	±20	
Transient Gate-emitter Voltage ($t_p \le 10\mu s$, D < 0.010)		±30	
Continuous DC Collector Current (T_c = 100°C, T_J = 175°C)	I_{CDC}	150	A
Repetitive Peak Collector Current (t_p = 1ms)	I_{CRM}	300	
Maximum Power Dissipation (T_c = 25°C, T_J = 175°C)	$P_{D(max)}$	735	W

Electrical Characteristics (1), (2)

Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
Collector-to-Emitter Breakdown Voltage	BV_{CES}	V_{GE} = 0V, I_C = 250μA	1200	-	-	V
Collector-to-Emitter Leakage Current	I_{CES}	V_{CE} = 1200V, V_{GE} = 0V	-	-	5	mA
Gate-to-Emitter Leakage Current	I_{GES}	V_{CE} = 0V, V_{GE} = ±20V	-	-	400	nA
Gate Threshold Voltage	$V_{GE(th)}$	V_{CE} = V_{GE} , I_C = 1.5mA	4.8	6.0	7.2	V
Collector-to-Emitter Saturation Voltage	$V_{CE(sat)}$	V_{GE} = 15V, I_C = 150A	-	1.6	2.0	
		V_{GE} = 15V, I_C = 150A, T_J =150°C	-	1.95	-	
		V_{GE} = 15V, I_C =150A, T_J =175°C	-	2.05	-	
Total Gate Charge	Q_g	V_{CC} = 600V, V_{GE} = ±15V, I_C = 150A	-	1.44	-	μC
Internal Gate Resistance	R_{Gint}	-	-	3	-	Ω
Input Capacitance	C_{iss}	V_{CE} = 25V, V_{GE} = 0V, f = 1MHz	-	9.73	-	nF
Output Capacitance	C_{oss}		-	0.68	-	
Reverse Transfer Capacitance	C_{rss}		-	0.13	-	
Turn-on Delay time	$t_{d(ON)}$	V_{CC} = 600V, V_{GE} = ±15V, R_G = 5.1Ω, I_C = 150A, L_{load} = 0.82mH, Energy losses include “tail” and diode reverse recovery.	-	358	-	ns
Rise Time	t_r		-	48	-	
Turn-off Delay time	$t_{d(OFF)}$		-	452	-	
Fall Time	t_f		-	154	-	
Turn-On Switching Loss	E_{on}		-	8.5	-	mJ
Turn-Off Switching Loss	E_{off}		-	10.0	-	
IGBT Total Switching Loss	E_{ts}		-	18.5	-	
Turn-on Delay time	$t_{d(ON)}$	V_{CC} = 600V, V_{GE} = ±15V, R_G = 5.1Ω, I_C = 150A, L_{load} = 0.82mH, Energy losses include “tail” and diode reverse recovery. T_J=150°C	-	632	-	ns
Rise Time	t_r		-	60	-	
Turn-off Delay time	$t_{d(OFF)}$		-	470	-	
Fall Time	t_f		-	278	-	
Turn-On Switching Loss	E_{on}		-	14.2	-	mJ
Turn-Off Switching Loss	E_{off}		-	16.8	-	
IGBT Total Switching Loss	E_{ts}		-	31	-	
Short Circuit Collector Current	$I_{C(SC)}$	V_{GE} = 15V, V_{CC} ≤ 600V, t_{SC} ≤ 10μs	-	600	-	A

• Diode, Chopper

Absolute Maximum Ratings

Parameter	Symbol	Limit	Unit
Repetitive Peak Reverse Voltage	V_{RRM}	1200	V
Continuous DC Forward Current	I_F	150	A
Repetitive Peak Forward Current (t_P = 1ms)	I_{FRM}	300	

Electrical Characteristics (1)

Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
Diode Forward Voltage	V_F	I_F = 150A	-	2.0	2.4	V
		I_F = 150A T_J = 150°C	-	1.8	-	
		I_F = 150A T_J = 175°C	-	1.75	-	
Diode Reverse-Recovery Charge	Q_{rr}	V_R = 600V, I_F = 150A, dI_F/dt = -1690 A/µs	-	10.66	-	µC
Diode Peak Reverse-Recovery Current	I_{rrm}		-	99	-	A
Diode Reverse-Recovery Loss	E_{rr}		-	3.35	-	mJ

• Diode, Reverse

Absolute Maximum Ratings

Parameter	Symbol	Limit	Unit
Repetitive Peak Reverse Voltage	V_{RRM}	1200	V
Continuous DC Forward Current	I_F	50	A
Repetitive Peak Forward Current (t_P=1ms)	I_{FRM}	100	

Electrical Characteristics (1)

Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
Diode Forward Voltage	V_F	I_F = 50A	-	2.0	2.45	V
		I_F = 50A T_J = 150°C	-	1.7	-	
		I_F = 50A T_J = 175°C	-	1.65	-	
Diode Reverse-Recovery Charge	Q_{rr}	V_R = 600V, I_F = 50A, dI_F/dt = -890 A/µs	-	3.37	-	µC
Diode Peak Reverse-Recovery Current	I_{rrm}		-	27	-	A
Diode Reverse-Recovery Loss	E_{rr}		-	1.5	-	mJ

• Module

Absolute Maximum Ratings

Parameter	Symbol	Limit	Unit
Maximum Junction Temperature	T_j	-40 to +175	°C
Operating Junction Temperature	$T_{vj\ op}$	-40 to +150	
Storage Temperature	T_{stg}	-40 to +125	
Isolation Voltage (f = 50Hz, t = 1min)	V_{ISO}	2.5	kV

Characteristics

Parameter	Symbol	Min	Typ	Max	Unit
Material of Module Baseplate	-	-	Cu	-	-
Internal Isolation	-	-	Al_2O_3	-	-
Creepage Distance, Terminal to Heatsink	-	-	17	-	mm
Creepage Distance, Terminal to Terminal	-	-	20	-	mm
Clearance, Terminal to Heatsink	-	-	17	-	mm
Clearance, Terminal to Terminal	-	-	9.5	-	mm
Stray Inductance, Module	L_{SCE}	-	30	-	nH
Module Lead Resistance, Terminal to Chip	$R_{CC'+EE'}$	-	0.65	-	mΩ
Junction-to-Case Thermal Resistance, per IGBT, Brake-Chopper	$R_{\theta JC}$	-	0.17	-	°C/W
Junction-to-Case Thermal Resistance, per Diode, Chopper		-	0.26	-	
Junction-to-Case Thermal Resistance, per Diode, Reverse		-	0.68	-	
Case-to-Heatsink Thermal Resistance, per IGBT, Brake-Chopper	$R_{\theta CH}$	-	0.08	-	°C/W
Case-to-Heatsink Thermal Resistance, per Diode, Chopper		-	0.15	-	
Case-to-Heatsink Thermal Resistance, per Diode, Reverse		-	0.41	-	
Case-to-Heatsink Thermal Resistance, per Module		-	0.05	-	
Mounting Torque for Module Mounting, Screw M6	M	3.0	-	5.0	Nm
Terminal Connection Torque, Screw M5	M	2.5	-	5.0	Nm
Weight per Module	G	-	160	-	g

(1) T_J = 25°C unless otherwise specified

(2) t_r: from 10% of Ic to 90% of Ic; t_f: from 90% of Ic to 10% of Ic;

E_{on}: from 10% of V_{GE} to 10% of V_{CE}; E_{off}: from 90% of V_{GE} to 10% of Ic.

• Typical Electrical Characteristics

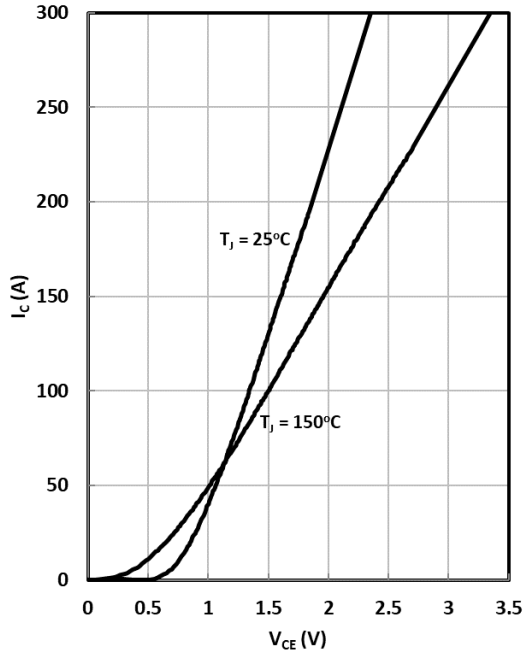


Fig. 1 IGBT (Brake-Chopper) Output Characteristics

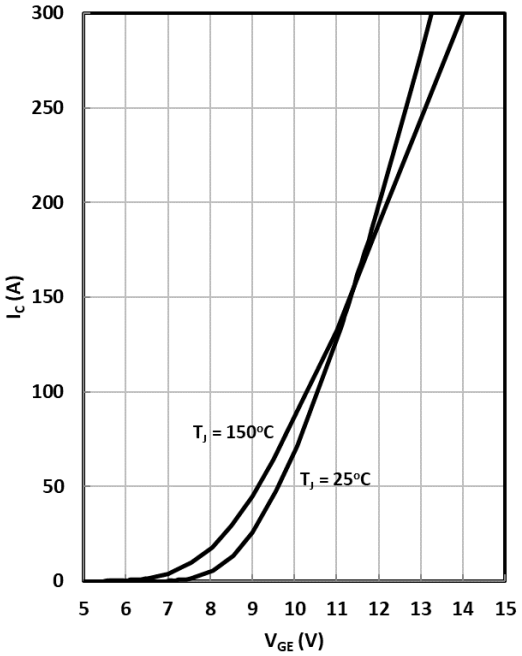


Fig. 2 IGBT (Brake-Chopper) Transfer Characteristics

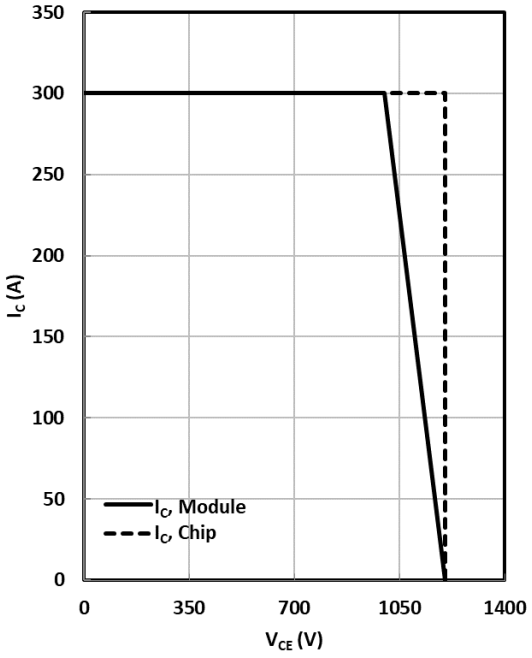


Fig. 3 RBSOA

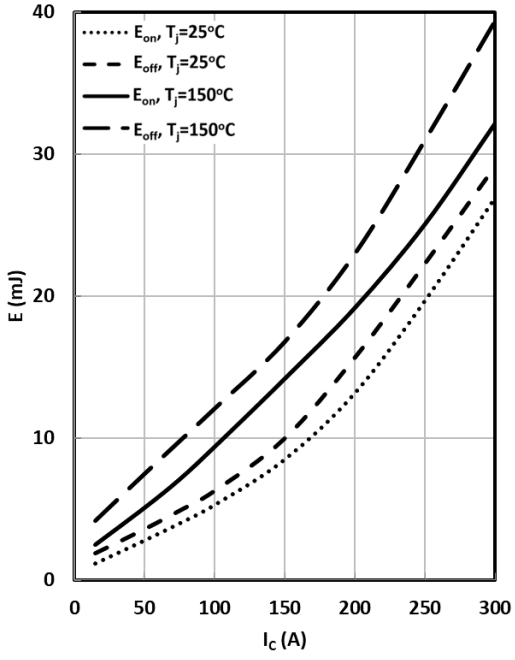


Fig. 4 IGBT (Brake-Chopper) Switching Loss vs. I_C

(V_{CC} = 600V, V_{GE} = ±15V, R_G = 5.1Ω)

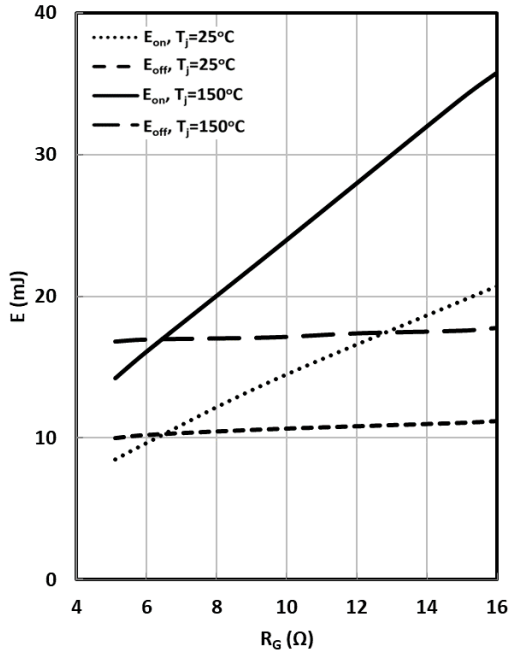


Fig. 5 IGBT (Brake-Chopper) Switching Loss vs. R_G

(V_{CC} = 600V, V_{GE} = ±15V, I_C = 150A)

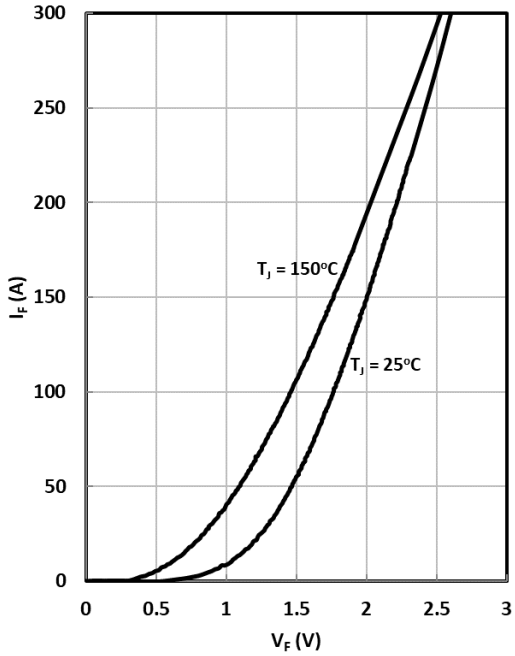


Fig. 6 Diode (Chopper) output characteristics

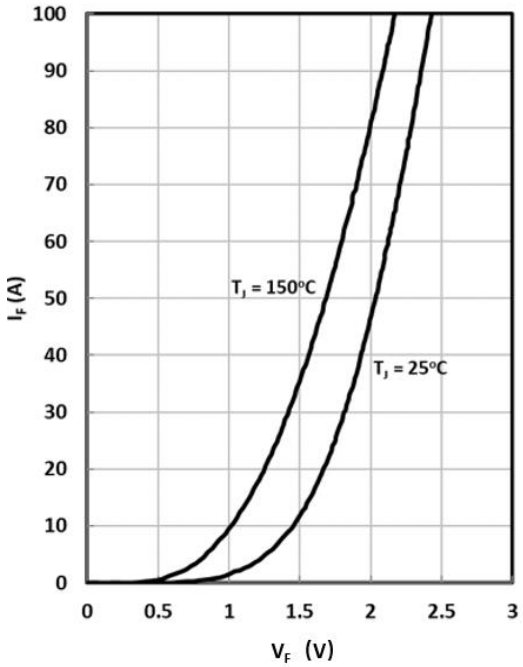
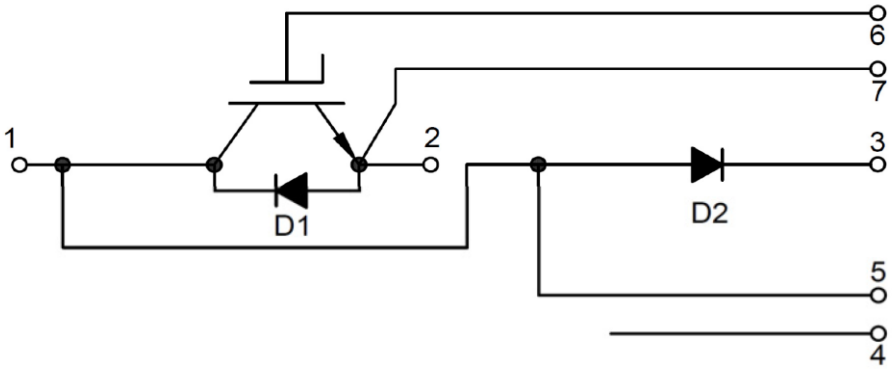
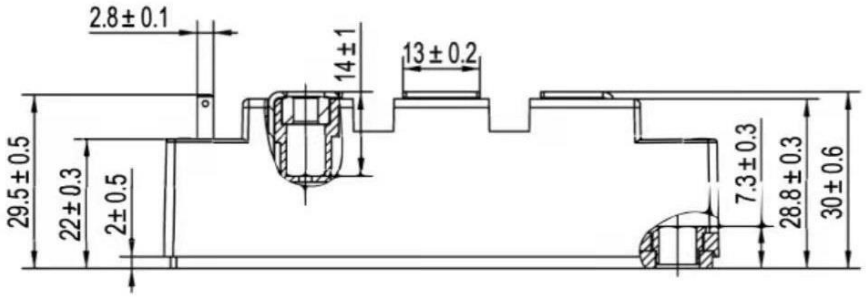


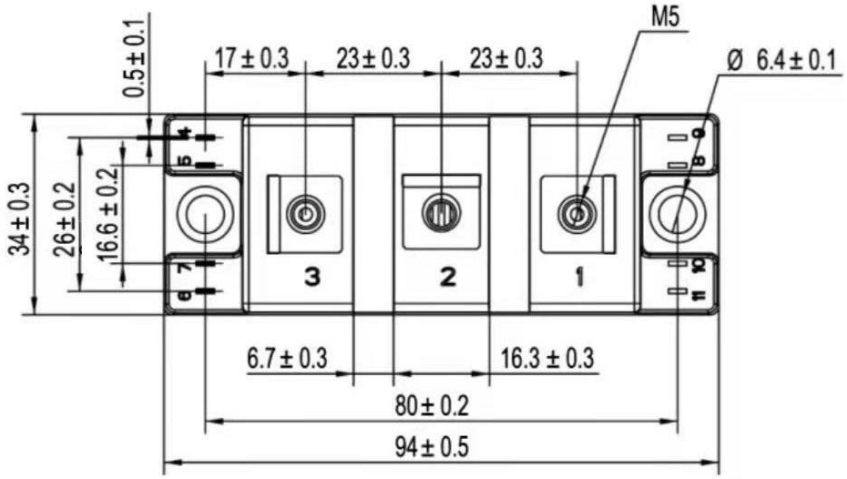
Fig. 7 Diode (Reverse) output characteristics

- **Circuit diagram**



- **Package Dimensions**





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