

FEATURES

- V_{CEsat} with positive temperature coefficient
- Low V_{cesat}
- Low switching losses
- Low inductance case
- Isolated copper baseplate using DBC technology

Preliminary Data CID 789ng (en-US) BDC 000000
EMC / Optm
VCES = 650V
IC nom = 400A / ICRM = 800A

APPLICATION

- Welding Machine
- UPS
- Motor Drives

Equivalent Circuit Schematic

IGBT, Inverter

Maximum Rated Values

Collector-emitter voltage	$T_{vj} = 25^{\circ}\text{C}$	V_{CES}	650	V
Continuous DC collector current	$T_c = 70^{\circ}\text{C}, T_{vj} \text{ max} = 175^{\circ}\text{C}$	I_c	400	A
Repetitive peak collector current	$t_p = 1 \text{ ms}$	I_{CRM}	800	A
Total power dissipation	$T_c = 25^{\circ}\text{C}, T_{vj} \text{ max} = 175^{\circ}\text{C}$	P_{tot}	1154	W
Gate-emitter peak voltage		V_{GES}	± 20	V

Characteristic Values

Collector-emitter saturation voltage	$I_c = 400\text{A}, V_{GE} = 15 \text{ V}$ $T_{vj} = 25^{\circ}\text{C}$	V_{CESat}	1.55	V
Gate threshold voltage	$I_c = 1.5 \text{ mA}, V_{CE} = V_{GE}$ $T_{vj} = 25^{\circ}\text{C}$	V_{GEth}	5.8	V
Gate charge	$V_{GE} = -15 / 15 \text{ V}$	Q_G	4.2	μC
Input capacitance	$f = 1 \text{ MHz}, T_{vj} = 25^{\circ}\text{C}, V_{CE} = 25 \text{ V}, V_{GE} = 0 \text{ V}$	C_{ies}	24	nF
Reverse transfer capacitance		C_{res}	0.81	nF
Collector-emitter cut-off current	$V_{CE} = 1200 \text{ V}, V_{GE} = 0 \text{ V}, T_{vj} = 25^{\circ}\text{C}$	I_{CES}	1.0	mA
Gate-emitter leakage current	$V_{CE} = 0 \text{ V}, V_{GE} = 20 \text{ V}, T_{vj} = 25^{\circ}\text{C}$	I_{GES}	400	nA
Turn-on delay time, inductive load	$I_c = 400\text{A}, V_{CE} = 300 \text{ V}$ $V_{GE} = -15 / 15 \text{ V}$ $R_G = 22$ $Di/dt \text{ on} = 1000\text{A}/\mu\text{s}$ $Dv/dt \text{ off} = 2900\text{A}/\mu\text{s}$ $T_{vj} = 25^{\circ}\text{C}$	t_{don}	0.58	μs
Rise time, inductive load		t_r	0.35	μs
Turn-off delay time, inductive load		t_{doff}	1.17	μs
Fall time, inductive load		t_f	0.13	μs
Turn-on energy loss per pulse		E_{on}	20.55	mJ
Turn-off energy loss per pulse		E_{off}	26.8	mJ
Thermal resistance, junction to case		per IGBT	R_{thJC}	0.13
Thermal resistance, case to heatsink	per IGBT $Paste = 1 \text{ W}/(\text{m} \cdot \text{K}) / \text{grease} = 1 \text{ W}/(\text{m} \cdot \text{K})$	R_{thCH}	0.03	K/W

Temperature under switching conditions

T

Diode, Inverter

Maximum Rated Values

Repetitive peak reverse voltage	$T_{vj} = 25^{\circ}\text{C}$	V_{RRM}	650	V
Continuous DC forward current		I_F	400	A
Repetitive peak forward current	$t_p = 1\text{ ms}$	I_{FRM}	800	A

Characteristic Values

Forward voltage	$I_F = 400\text{ A}, V_{GE} = 0\text{ V}$ $T_{vj} = 25^{\circ}\text{C}$	V_F		1.76	V
Peak reverse recovery current	$I_F = 400\text{ A},$ $V_R = 300\text{ V}, V_{GE} = -15\text{ V}$ $RG = 22$ $T_{vj} = 25^{\circ}\text{C}$	I_{RR}		107	A
Recovered charge		Q_{RR}		7	μC
Reverse recovery energy		E_{rec}		1.01	mJ
Thermal resistance, junction to case	per diode	R_{thJC}			0.2 K/W
Thermal resistance, case to heatsink	per diode $I_{paste} = 1\text{ W}/(\text{m}\cdot\text{K}) / I_{grease} = 1\text{ W}/(\text{m}\cdot\text{K})$	R_{thCH}		0.06	K/W
Temperature under switching conditions		$T_{vj\ op}$	-40	150	$^{\circ}\text{C}$

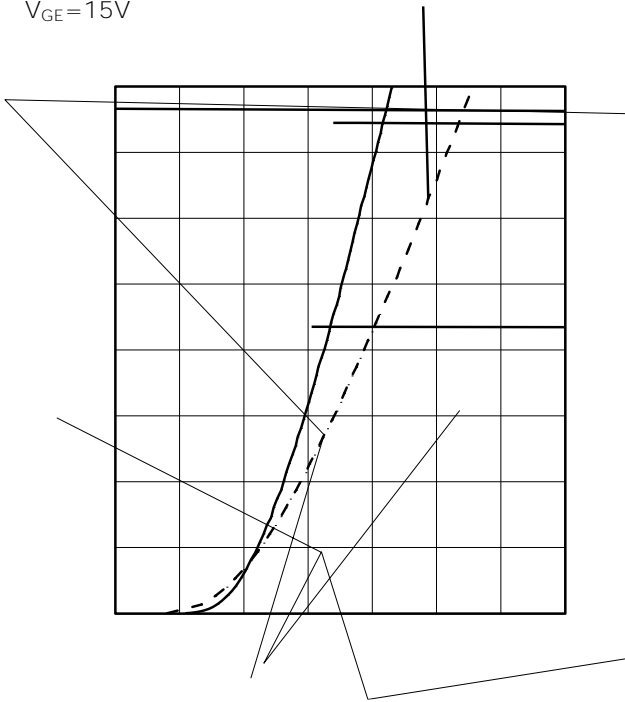
Module

Maximum Rated Values

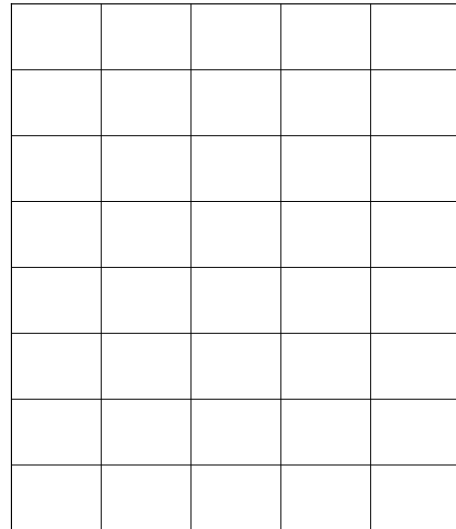
Isolation test voltage	RMS, f = 50 Hz, t = 1 min.	V _{ISOL}	2.5	kV

Internal isolation

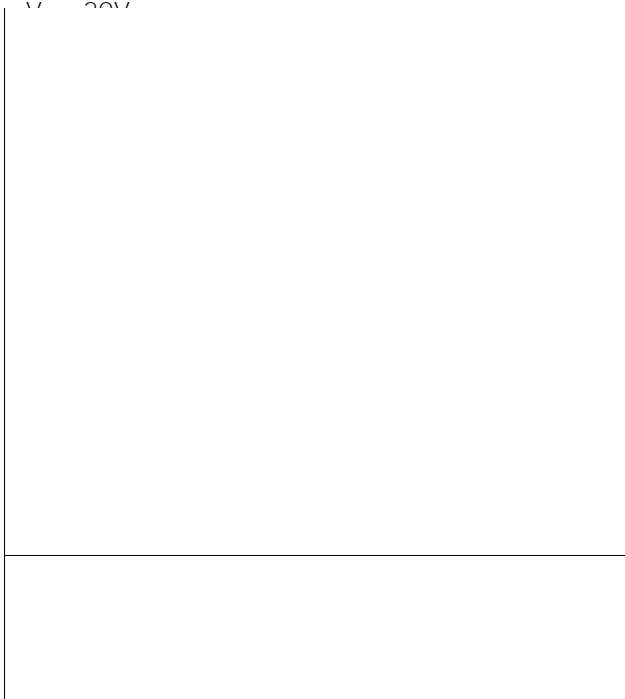
$I_C = f(V_{CE})$
 $V_{GE} = 15V$



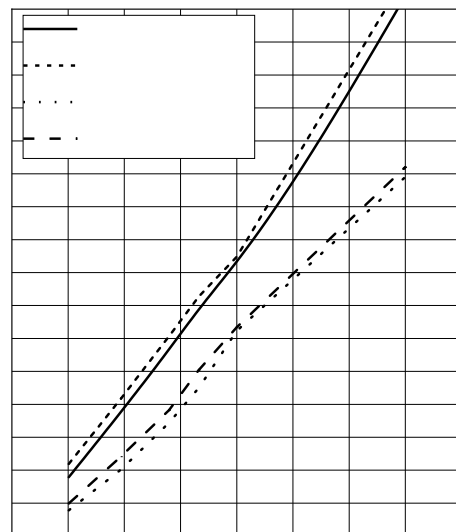
$I_C = f(V_{CE})$
 $T_J = 150$



$I_C = f(V_{CE})$
 $V_{GE} = 20V$

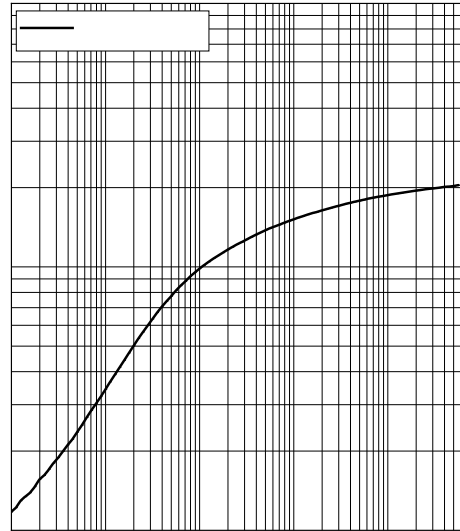
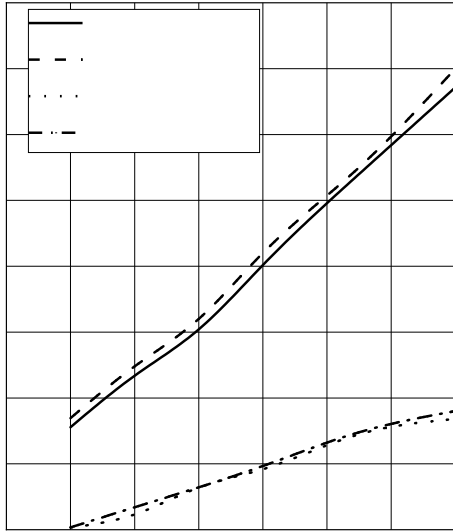


$E_{on} = f(I_C), E_{off} = f(I_C)$
 $V_{GE} = \pm 15V, R_{Gon} = 20, R_{Goff} = 20, V_{CE} = 400V$



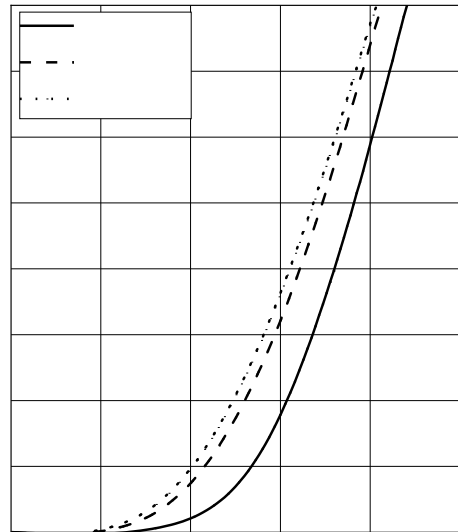
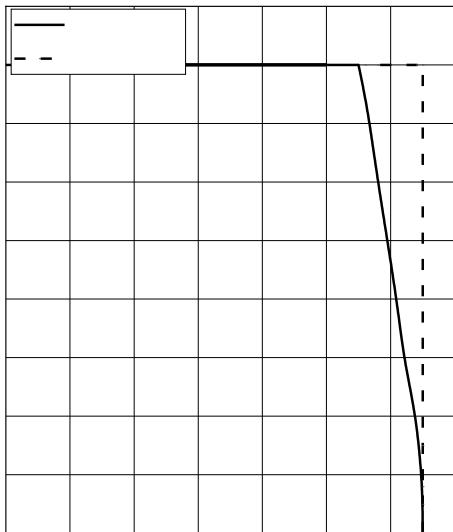
$E_{on}=f(R_G), E_{off}=f(R_G)$
 $V_{GE}=\pm 15V, I_C=400A, V_{CE}=400V$

$Z_{thJC}=f(t)$

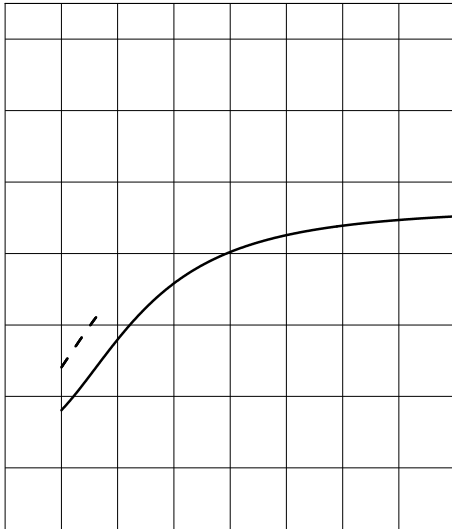


$I_C=f(V_{CE})$
 $V_{GE}=\pm 15V, R_{Goff}=20, T_J=150$

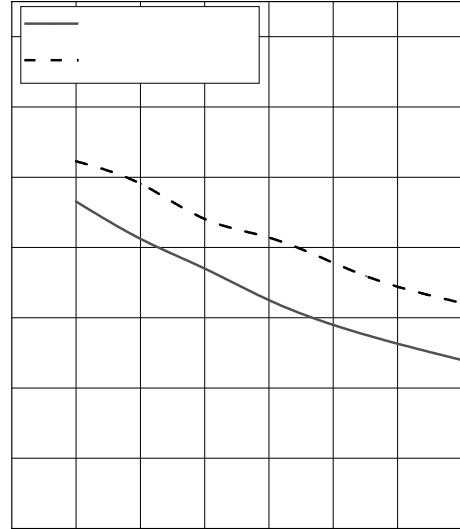
$I_F=f(V_F)$



$E_{rec} = f(I_F)$
 $R_{Gon} = 20 \Omega, V_{CE} = 400V$



$E_{rec} = f(R_G)$
 $I_F = 400A, V_{CE} = 400V$



$Z_{thJC} = f(t)$

