

FEATURES

- ☐ IGBT³ CHIP(1700V Trench+Field Stop technology)
- ☐ Low turn-off losses, short tail current
- ☐ $V_{CE(sat)}$ with positive temperature coefficient
- ☐ DIODE CHIP(1700V EMCON 3 technology)
- ☐ Free wheeling diodes with fast and soft reverse recovery

APPLICATIONS

- ☐ AC motor control
- ☐ Motion/servo control
- ☐ Photovoltaic/Fuel cell
- ☐ Inverter and power supplies



INVERTER SECTOR

ABSOLUTE MAXIMUM RATINGS

$T_c=25^{\circ}\text{C}$ unless otherwise specified

Symbol	Parameter	Test Conditions	Values	Unit
IGBT				
V_{CES}	Collector - Emitter Voltage	$T_{vj}=25^{\circ}\text{C}$	1700	V
V_{GES}	Gate - Emitter Voltage		± 20	V
I_c	DC Collector Current	$T_c=25^{\circ}\text{C}$	600	A
		$T_c=80^{\circ}\text{C}$	450	A
I_{CM}	Repetitive Peak Collector Current	$t_p=1\text{ms}$	900	A
P_{tot}	Power Dissipation Per IGBT		2250	W
Diode				
V_{RRM}	Repetitive Reverse Voltage	$T_{vj}=25^{\circ}\text{C}$	1700	V
$I_{F(AV)}$	Average Forward Current	$T_c=25^{\circ}\text{C}$	450	A
		$T_c=80^{\circ}\text{C}$	350	A
I_{FRM}	Repetitive Peak Forward Current	$t_p=1\text{ms}$	900	A
I^2t		$T_{vj}=125^{\circ}\text{C}$, $t=10\text{ms}$, $V_R=0\text{V}$	20000	A^2s

INVERTER SECTOR

ELECTRICAL AND THERMAL CHARACTERISTICS

 $T_C=25^{\circ}\text{C}$ unless otherwise specified

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
IGBT						
$V_{GE(th)}$	Gate - Emitter Threshold Voltage	$V_{CE}=V_{GE}$, $I_C=18\text{mA}$	5.0	5.8	6.4	V
$V_{CE(sat)}$	Collector - Emitter Saturation Voltage	$I_C=450\text{A}$, $V_{GE}=15\text{V}$, $T_{VJ}=25^{\circ}\text{C}$		2.0	2.45	V
		$I_C=450\text{A}$, $V_{GE}=15\text{V}$, $T_{VJ}=125^{\circ}\text{C}$		2.4		V
I_{CES}	Collector Leakage Current	$V_{CE}=1700\text{V}$, $V_{GE}=0\text{V}$, $T_{VJ}=25^{\circ}\text{C}$			3	mA
		$V_{CE}=1700\text{V}$, $V_{GE}=0\text{V}$, $T_{VJ}=125^{\circ}\text{C}$			20	mA
I_{GES}	Gate Leakage Current	$V_{CE}=0\text{V}$, $V_{GE} \pm 15\text{V}$, $T_{VJ}=125^{\circ}\text{C}$	-400		400	nA
R_{Gint}	Integrated Gate Resistor			1.7		Ω
Q_{ge}	Gate Charge	$V_{CE}=900\text{V}$, $I_C=450\text{A}$, $V_{GE} = \pm 15\text{V}$		5.1		μC
C_{ies}	Input Capacitance	$V_{CE}=25\text{V}$, $V_{GE}=0\text{V}$, $f=1\text{MHz}$		40.5		nF
C_{res}	Reverse Transfer Capacitance			1.3		nF
$t_{d(on)}$	Turn - on Delay Time	$V_{CC}=900\text{V}$, $I_C=450\text{A}$, $T_{VJ}=25^{\circ}\text{C}$		280		ns
		$R_G=3.3\Omega$, $T_{VJ}=125^{\circ}\text{C}$		300		ns
t_r	Rise Time	$V_{GE} = \pm 15\text{V}$, $T_{VJ}=25^{\circ}\text{C}$		80		ns
		Inductive Load $T_{VJ}=125^{\circ}\text{C}$		100		ns
$t_{d(off)}$	Turn - off Delay Time	$V_{CC}=900\text{V}$, $I_C=450\text{A}$, $T_{VJ}=25^{\circ}\text{C}$		810		ns
		$R_G=3.3\Omega$, $T_{VJ}=125^{\circ}\text{C}$		1000		ns
t_f	Fall Time	$V_{GE} = \pm 15\text{V}$, $T_{VJ}=25^{\circ}\text{C}$		180		ns
		Inductive Load $T_{VJ}=125^{\circ}\text{C}$		300		ns
E_{on}	Turn - on Energy	$V_{CC}=900\text{V}$, $I_C=45\text{A}$, $T_{VJ}=25^{\circ}\text{C}$		96.5		mJ
		$R_G=3.3\Omega$, $T_{VJ}=125^{\circ}\text{C}$		140		mJ
E_{off}	Turn - off Energy	$V_{GE} = \pm 15\text{V}$, $T_{VJ}=25^{\circ}\text{C}$		96		mJ
		Inductive Load $T_{VJ}=125^{\circ}\text{C}$		140		mJ
I_{sc}	Short Circuit Current	$t_{psc} \leq 10\mu\text{s}$, $V_{GE}=15\text{V}$ $T_{VJ}=125^{\circ}\text{C}$, $V_{CC}=1000\text{V}$		1800		A
R_{thJC}	Junction-to-Case Thermal Resistance (Per IGBT)				0.055	K /W
Diode						
V_F	Forward Voltage	$I_F=450\text{A}$, $V_{GE}=0\text{V}$, $T_{VJ}=25^{\circ}\text{C}$		1.8	2.2	V
		$I_F=450\text{A}$, $V_{GE}=0\text{V}$, $T_{VJ}=125^{\circ}\text{C}$		1.9		V
I_{RRM}	Max. Reverse Recovery Current	$I_F=450\text{A}$, $V_R=900\text{V}$		570		A
Q_{rr}	Reverse Recovery Charge	$di_F/dt=-4500\text{A}/\mu\text{s}$		195		μC
E_{rec}	Reverse Recovery Energy	$T_{VJ}=125^{\circ}\text{C}$		110		mJ
R_{thJCD}	Junction-to-Case Thermal Resistance (Per Diode)				0.10	K /W

MMG450WB170B6EN

NTC CHARACTERISTIC VALUES

$T_C=25^{\circ}\text{C}$ unless otherwise specified

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
R_{25}	Resistance	$T_C = 25^{\circ}\text{C}$		5		$\text{K}\Omega$
$B_{25/50}$				3375		K

MODULE CHARACTERISTICS

$T_C=25^{\circ}\text{C}$ unless otherwise specified

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
$T_{VJ\max}$	Max. Junction Temperature				150	$^{\circ}\text{C}$
$T_{VJ\text{op}}$	Operating Temperature		-40		125	$^{\circ}\text{C}$
T_{stg}	Storage Temperature		-40		125	$^{\circ}\text{C}$
V_{isol}	Insulation Test Voltage	AC, $t=1\text{min}$		3500		V
CTI	Comparative Tracking Index		250			
Torque	Module-to-Sink	Recommended (M5)	2.5		5	$\text{N} \cdot \text{m}$
Torque	Module Electrodes	Recommended (M6)	3		5	$\text{N} \cdot \text{m}$
Weight				350		g

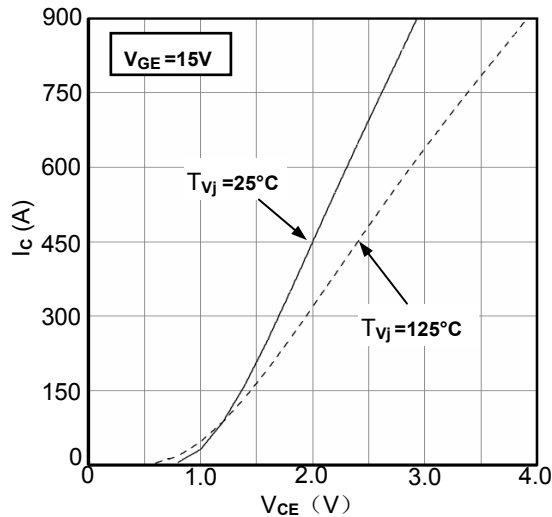


Figure1. Typical Output Characteristics
IGBT-inverter

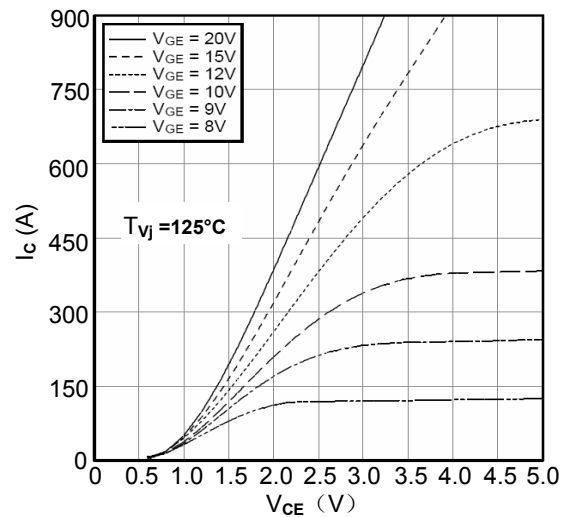


Figure2. Typical Output Characteristics
IGBT-inverter

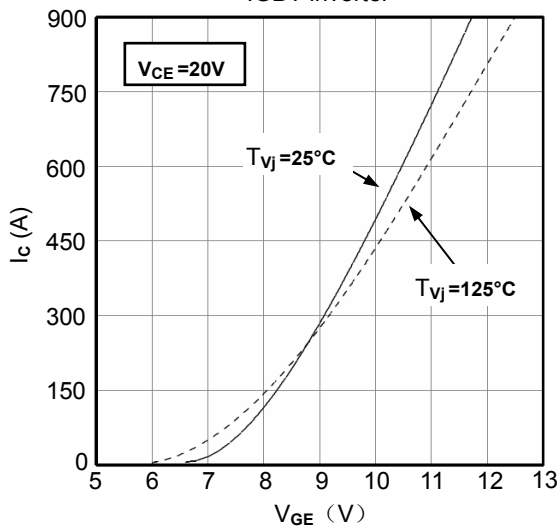


Figure3. Typical Transfer characteristics
IGBT-inverter

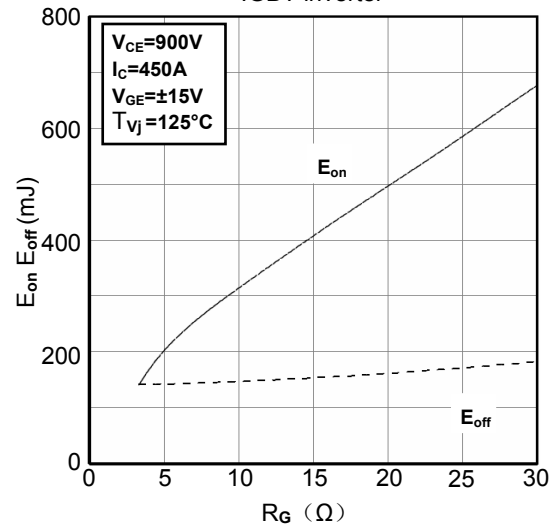


Figure4. Switching Energy vs. Gate Resistor
IGBT-inverter

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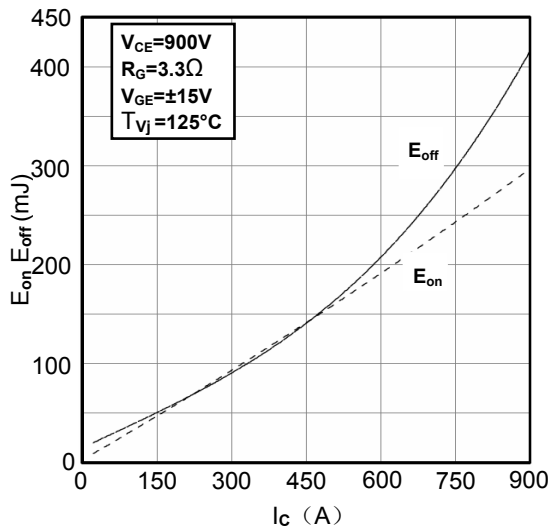


Figure5. Switching Energy vs. Collector Current IGBT-inverter

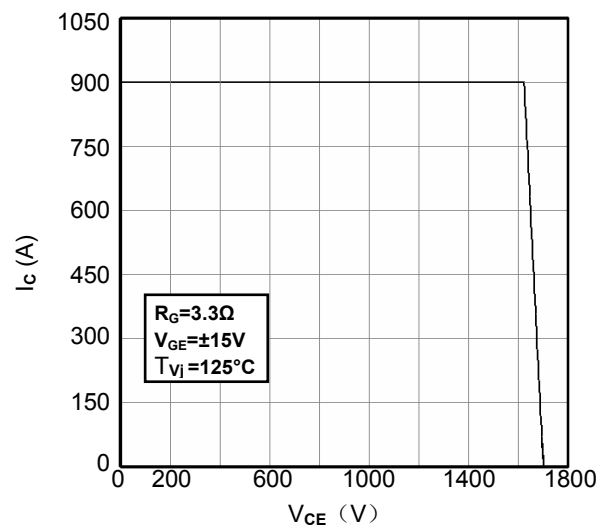


Figure6. Reverse Biased Safe Operating Area IGBT-inverter

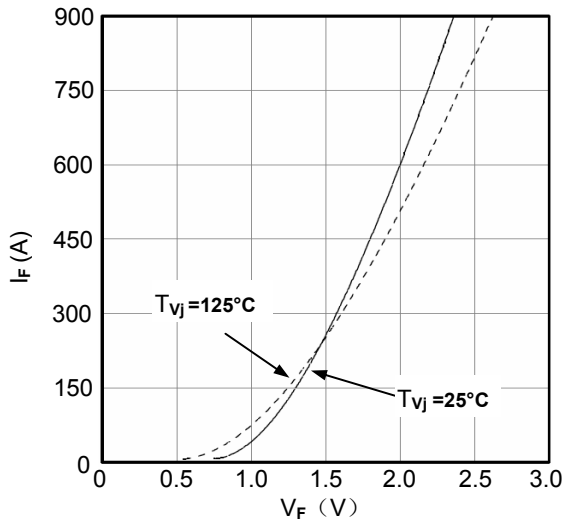


Figure7. Diode Forward Characteristics Diode -inverter

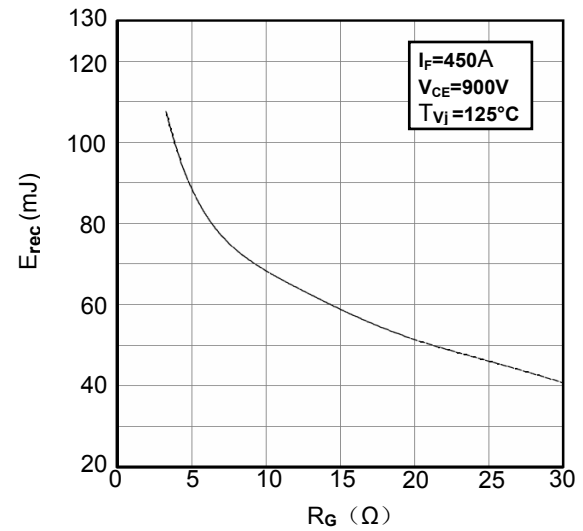


Figure8. Switching Energy vs. Gate Resistor Diode -inverter

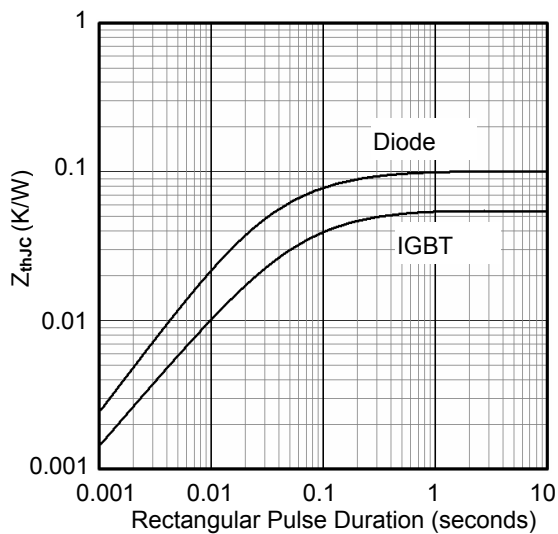


Figure9. Transient Thermal Impedance of Diode and IGBT-inverter

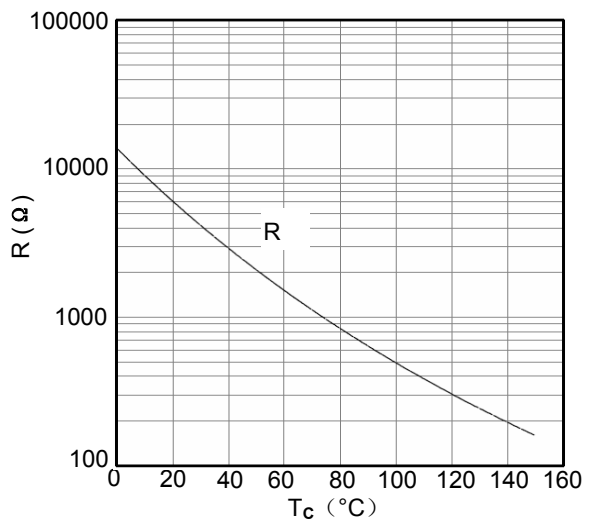


Figure10. NTC Characteristics

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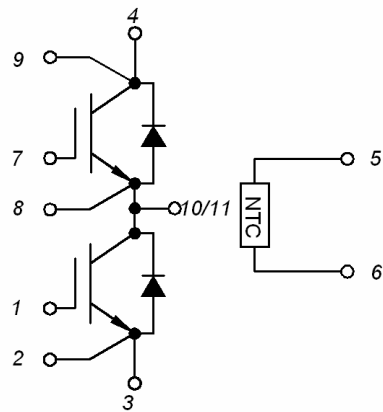


Figure11. Circuit Diagram

