

PRODUCT FEATURES

- IGBT CHIP(Trench+FS)
- Low saturation voltage and positive temperature coefficient
- Fast switching and short tail current
- Free wheeling diodes with fast and soft reverse recovery
- Temperature sense included



APPLICATIONS

- Automotive application
- Hybrid and electric vehicle
- Inverter for motor drive

IGBT-ABSOLUTE MAXIMUM RATINGS ($T_C=25^\circ\text{C}$ unless otherwise specified)

Symbol	Parameter/Test Conditions		Values	Unit
V_{CES}	Collector Emitter Voltage	$T_J=25^\circ\text{C}$	750	V
V_{GES}	Gate Emitter Voltage		± 20	
I_C	DC Collector Current	$T_C=25^\circ\text{C}, T_{Jmax}=175^\circ\text{C}$	343	A
		$T_C=65^\circ\text{C}, T_{Jmax}=175^\circ\text{C}$	280	
I_{CM}	Repetitive Peak Collector Current	$t_p=1\text{ms}$	560	
P_{tot}	Power Dissipation Per IGBT	$T_C=25^\circ\text{C}, T_{Jmax}=175^\circ\text{C}$	595	W

Diode-ABSOLUTE MAXIMUM RATINGS ($T_C=25^\circ\text{C}$ unless otherwise specified)

Symbol	Parameter/Test Conditions		Values	Unit
V_{RRM}	Repetitive Reverse Voltage	$T_J=25^\circ\text{C}$	750	V
$I_{F(AV)}$	Average Forward Current		280	A
I_{FRM}	Repetitive Peak Forward Current	$t_p=1\text{ms}$	560	
I^2t		$T_J=125^\circ\text{C}, t=10\text{ms}, V_R=0\text{V}$	12800	A^2s

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MMG280VD075X6T7

IGBT-inverter

ELECTRICAL CHARACTERISTICS ($T_C=25^\circ\text{C}$ unless otherwise specified)

Symbol	Parameter/Test Conditions		Min.	Typ.	Max.	Unit
$V_{GE(th)}$	Gate Emitter Threshold Voltage	$V_{CE}=V_{GE}, I_C=3.2\text{mA}$	5.0	5.9	6.5	V
$V_{CE(sat)}$	Collector Emitter Saturation Voltage	$I_C=280\text{A}, V_{GE}=15\text{V}, T_J=25^\circ\text{C}$		1.38		
		$I_C=280\text{A}, V_{GE}=15\text{V}, T_J=125^\circ\text{C}$		1.50		
		$I_C=280\text{A}, V_{GE}=15\text{V}, T_J=175^\circ\text{C}$		1.58		
I_{CES}	Collector Leakage Current	$V_{CE}=750\text{V}, V_{GE}=0\text{V}, T_J=25^\circ\text{C}$			10	μA
I_{GES}	Gate Leakage Current	$V_{CE}=0\text{V}, V_{GE}=\pm 20\text{V}, T_J=25^\circ\text{C}$	-200		200	nA
R_{Gint}	Integrated Gate Resistor			3.5		Ω
Q_g	Gate Charge	$V_{CE}=400\text{V}, I_C=280\text{A}, V_{GE}=15\text{V}$		1		μC
C_{ies}	Input Capacitance	$V_{CE}=25\text{V}, V_{GE}=0\text{V}, f=1\text{MHz}$		27.5		nF
C_{oes}	Output Capacitance			1.6		nF
C_{res}	Reverse Transfer Capacitance			0.14		nF
$t_{d(on)}$	Turn on Delay Time	$V_{CC}=400\text{V}, I_C=280\text{A}, R_G=2.5\Omega, V_{GE}=\pm 15\text{V},$ Inductive Load	$T_J=25^\circ\text{C}$		160	ns
			$T_J=125^\circ\text{C}$		175	ns
			$T_J=175^\circ\text{C}$		180	ns
t_r	Rise Time		$T_J=25^\circ\text{C}$		55	ns
			$T_J=125^\circ\text{C}$		62	ns
			$T_J=175^\circ\text{C}$		65	ns
E_{on}	Turn on Energy		$T_J=25^\circ\text{C}$		5.1	mJ
			$T_J=125^\circ\text{C}$		6.7	mJ
			$T_J=175^\circ\text{C}$		7.8	mJ
$t_{d(off)}$	Turn off Delay Time	$T_J=25^\circ\text{C}$		330	ns	
		$T_J=125^\circ\text{C}$		360	ns	
		$T_J=175^\circ\text{C}$		370	ns	
t_f	Fall Time	$T_J=25^\circ\text{C}$		100	ns	
		$T_J=125^\circ\text{C}$		140	ns	
		$T_J=175^\circ\text{C}$		150	ns	
E_{off}	Turn off Energy	$T_J=25^\circ\text{C}$		11.3	mJ	
		$T_J=125^\circ\text{C}$		15.5	mJ	
		$T_J=175^\circ\text{C}$		16.8	mJ	
I_{SC}	Short Circuit Current	$t_{psc}\leq 6\mu\text{s}, V_{GE}=15\text{V}$ $T_J=150^\circ\text{C}, V_{CC}=400\text{V}$		1200		A
R_{thJC}	Junction to Case Thermal Resistance (Per IGBT)			0.214	0.252	K /W

MMG280VD075X6T7

Diode-inverter

ELECTRICAL CHARACTERISTICS ($T_C=25^\circ\text{C}$ unless otherwise specified)

Symbol	Parameter/Test Conditions		Min.	Typ.	Max.	Unit
V_F	Forward Voltage	$I_F=280\text{A}$, $V_{GE}=0\text{V}$, $T_J=25^\circ\text{C}$		1.50		V
		$I_F=280\text{A}$, $V_{GE}=0\text{V}$, $T_J=125^\circ\text{C}$		1.55		
		$I_F=280\text{A}$, $V_{GE}=0\text{V}$, $T_J=175^\circ\text{C}$		1.55		
t_{rr}	Reverse Recovery Time	$I_F=280\text{A}$, $V_R=400\text{V}$ ($di_F/dt=-4900\text{A}/\mu\text{s}$, $T_J=175^\circ\text{C}$)	$T_J=25^\circ\text{C}$		156	ns
			$T_J=125^\circ\text{C}$		210	
			$T_J=175^\circ\text{C}$		240	
I_{RRM}	Max. Reverse Recovery Current		$T_J=25^\circ\text{C}$		263	A
			$T_J=125^\circ\text{C}$		290	
			$T_J=175^\circ\text{C}$		310	
Q_{RR}	Reverse Recovery Charge		$T_J=25^\circ\text{C}$		18.7	μC
			$T_J=125^\circ\text{C}$		26.6	
			$T_J=175^\circ\text{C}$		31.3	
E_{rec}	Reverse Recovery Energy	$T_J=25^\circ\text{C}$		8.4	mJ	
		$T_J=125^\circ\text{C}$		12.5		
		$T_J=175^\circ\text{C}$		14		
R_{thJCD}	Junction to Case Thermal Resistance (Per Diode)			0.204	0.25	K/W

NTC CHARACTERISTICS ($T_C=25^\circ\text{C}$ unless otherwise specified)

Symbol	Parameter/Test Conditions		Min.	Typ.	Max.	Unit
R_{25}	Resistance	$T_C=25^\circ\text{C}$		5		k Ω
$B_{25/50}$	$R_2 = R_{25} \exp [B_{25/50}(1/T_2 - 1/(298.15 \text{ K}))]$			3375		K

MODULE CHARACTERISTICS ($T_C=25^\circ\text{C}$ unless otherwise specified)

Symbol	Parameter/Test Conditions		Values	Unit
T_{Jmax}	Max. Junction Temperature		175	$^\circ\text{C}$
T_{jop}	Operating Temperature		-40~175	
T_{stg}	Storage Temperature		-40~125	
V_{isol}	Isolation Breakdown Voltage	AC, 50Hz(R.M.S), t=1minute	3300	V
CTI	Comparative Tracking Index		> 100	
Torque	to heatsink	Recommended (M5)	3~5	Nm
	to terminal	Recommended (M6)	3~5	Nm
Weight			450	g

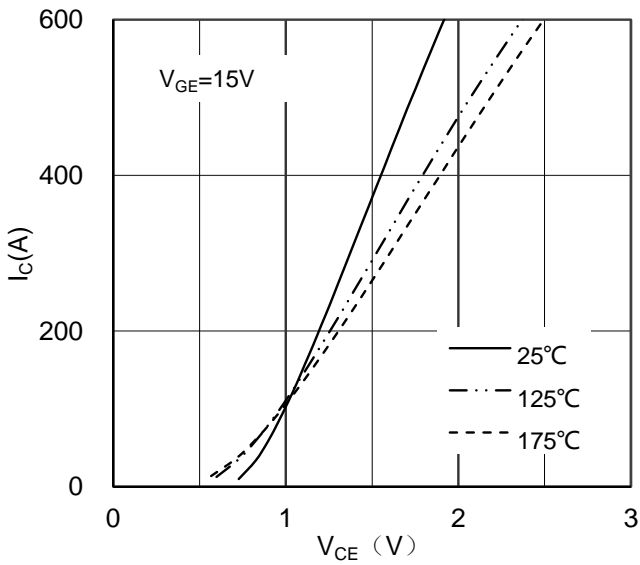


Figure 1. Typical Output Characteristics IGBT

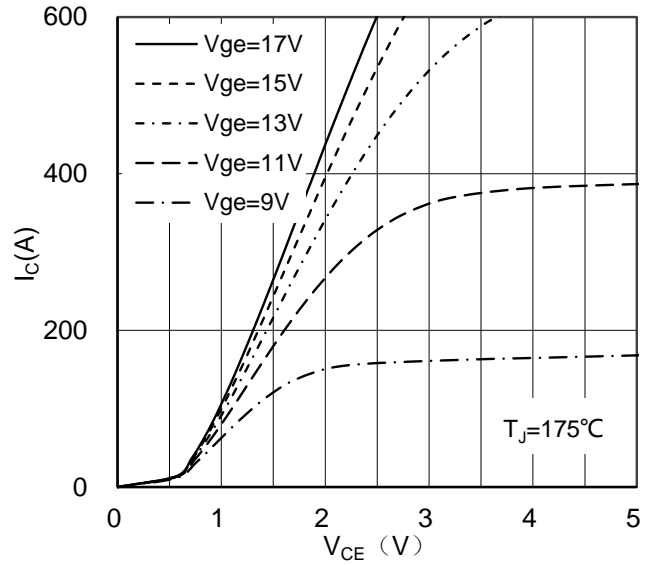


Figure 2. Typical Output Characteristics IGBT

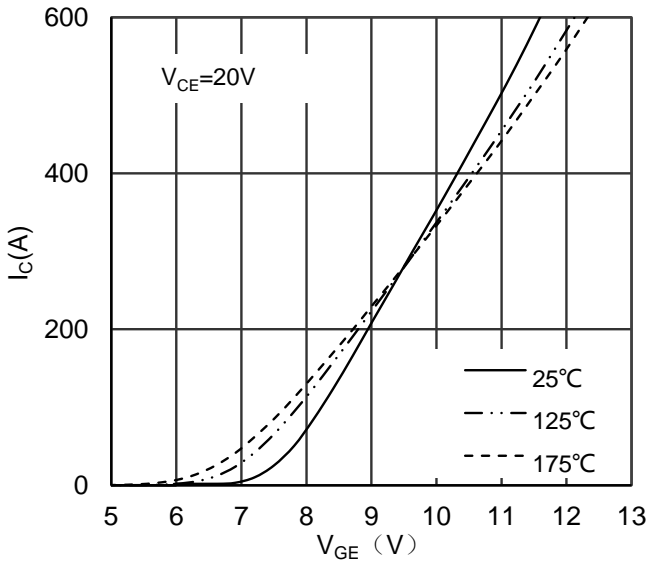


Figure 3. Typical Transfer characteristics IGBT

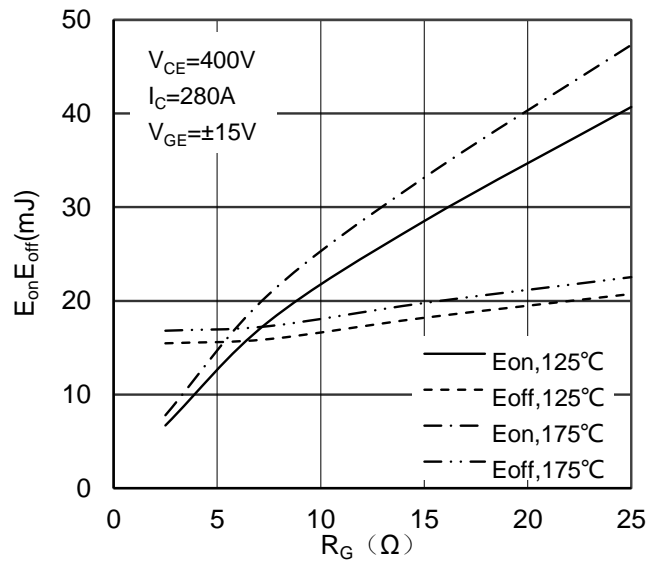


Figure 4. Switching Energy vs Gate Resistor IGBT

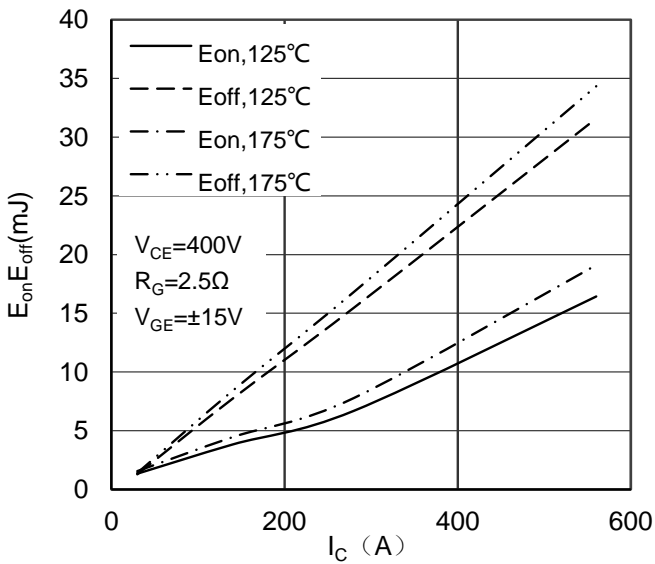


Figure 5. Switching Energy vs Collector Current IGBT

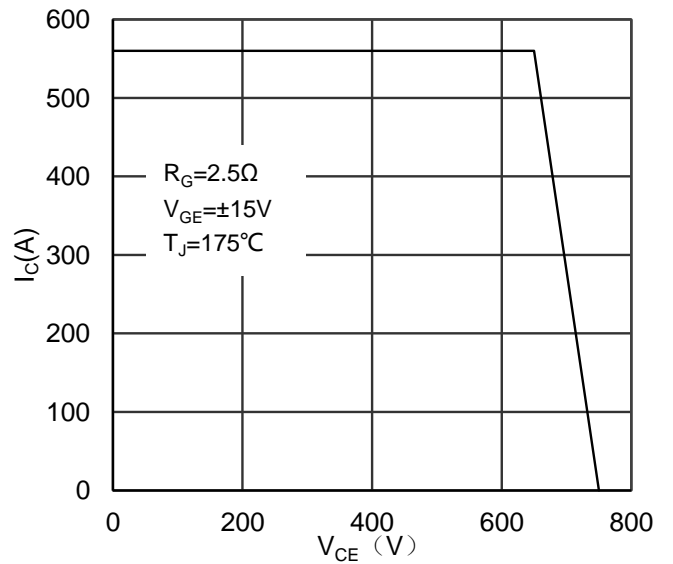


Figure 6. Reverse Biased Safe Operating Area IGBT

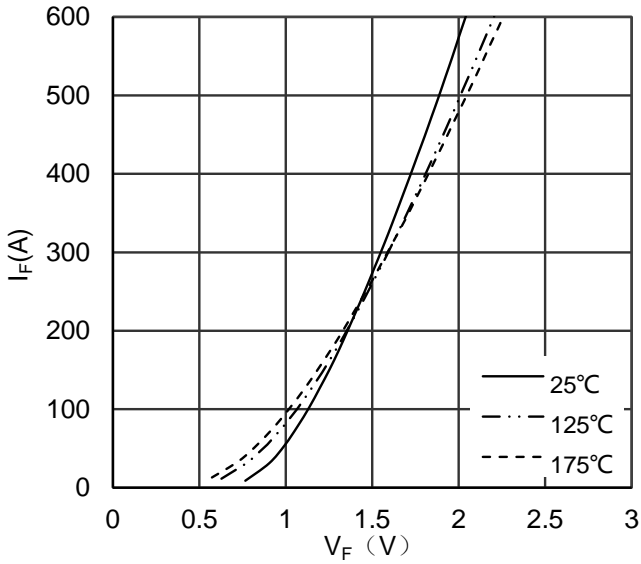


Figure 7. Diode Forward Characteristics Diode

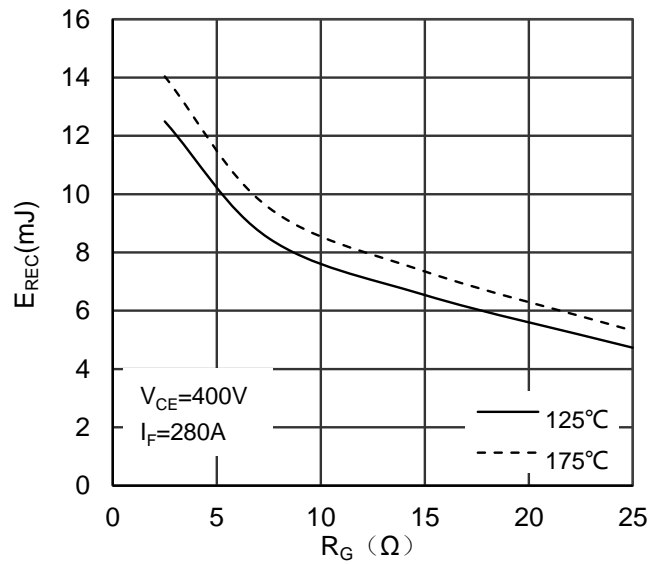


Figure 8. Switching Energy vs Gate Resistor Diode

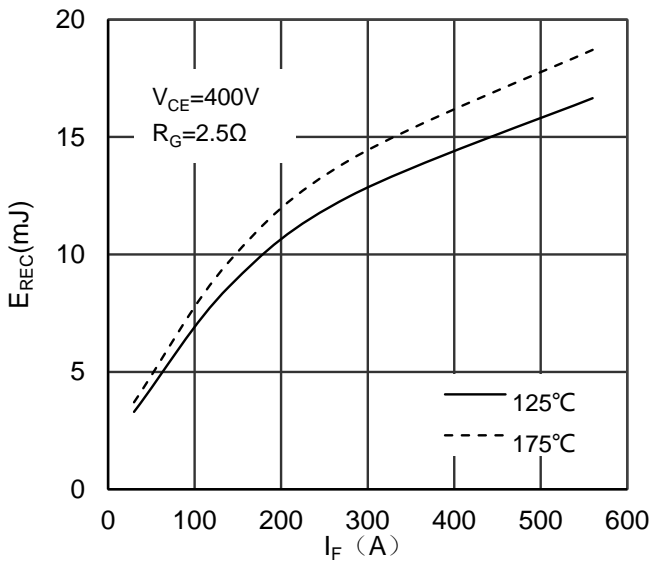


Figure 9. Switching Energy vs Forward Current Diode

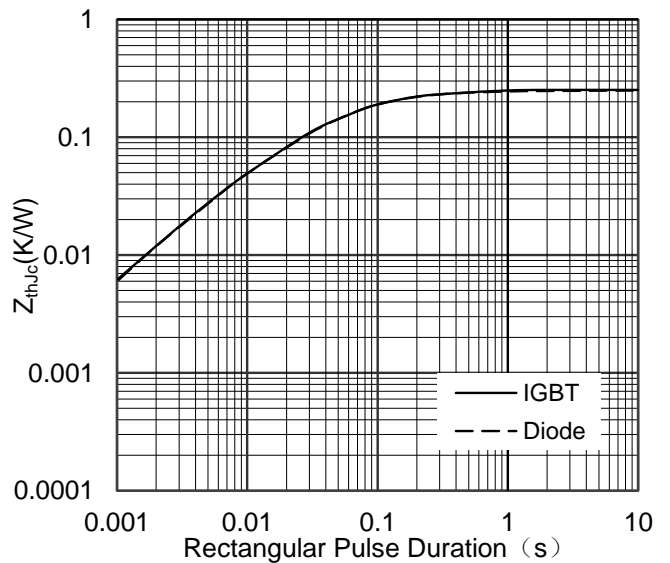


Figure 10. Transient Thermal Impedance of Diode and IGBT

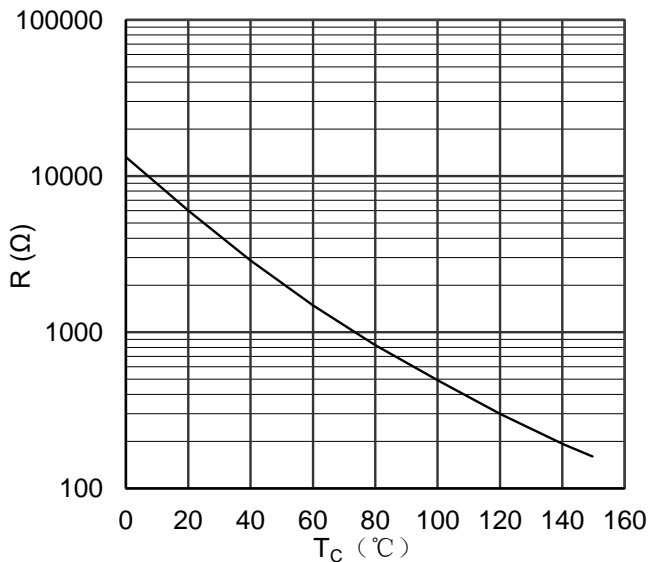


Figure 11. NTC Characteristics

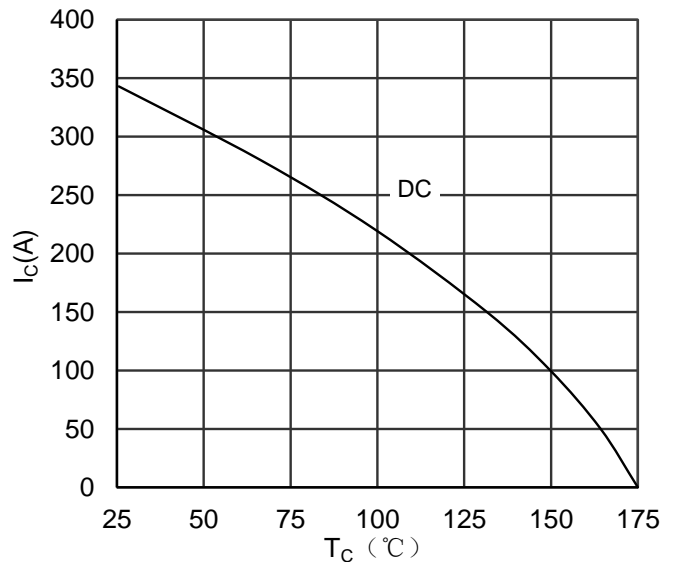


Figure 12. Collector Current vs Case temperature IGBT

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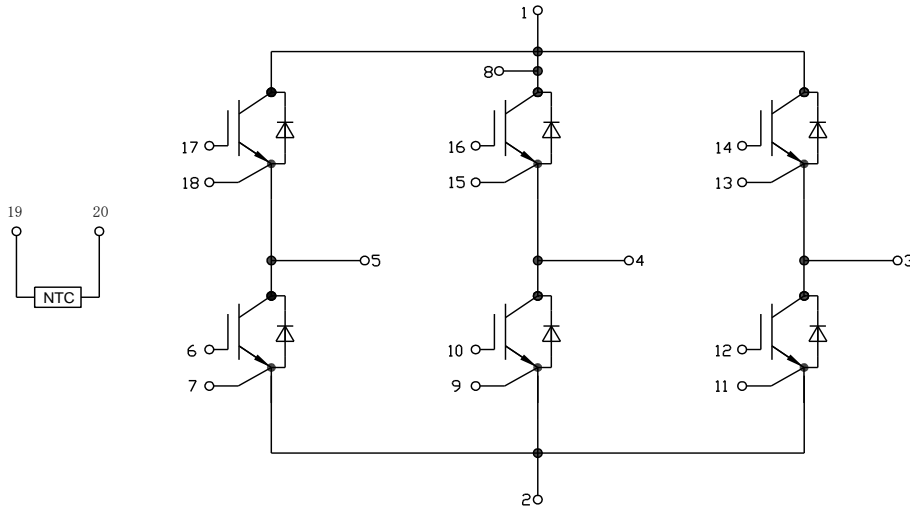
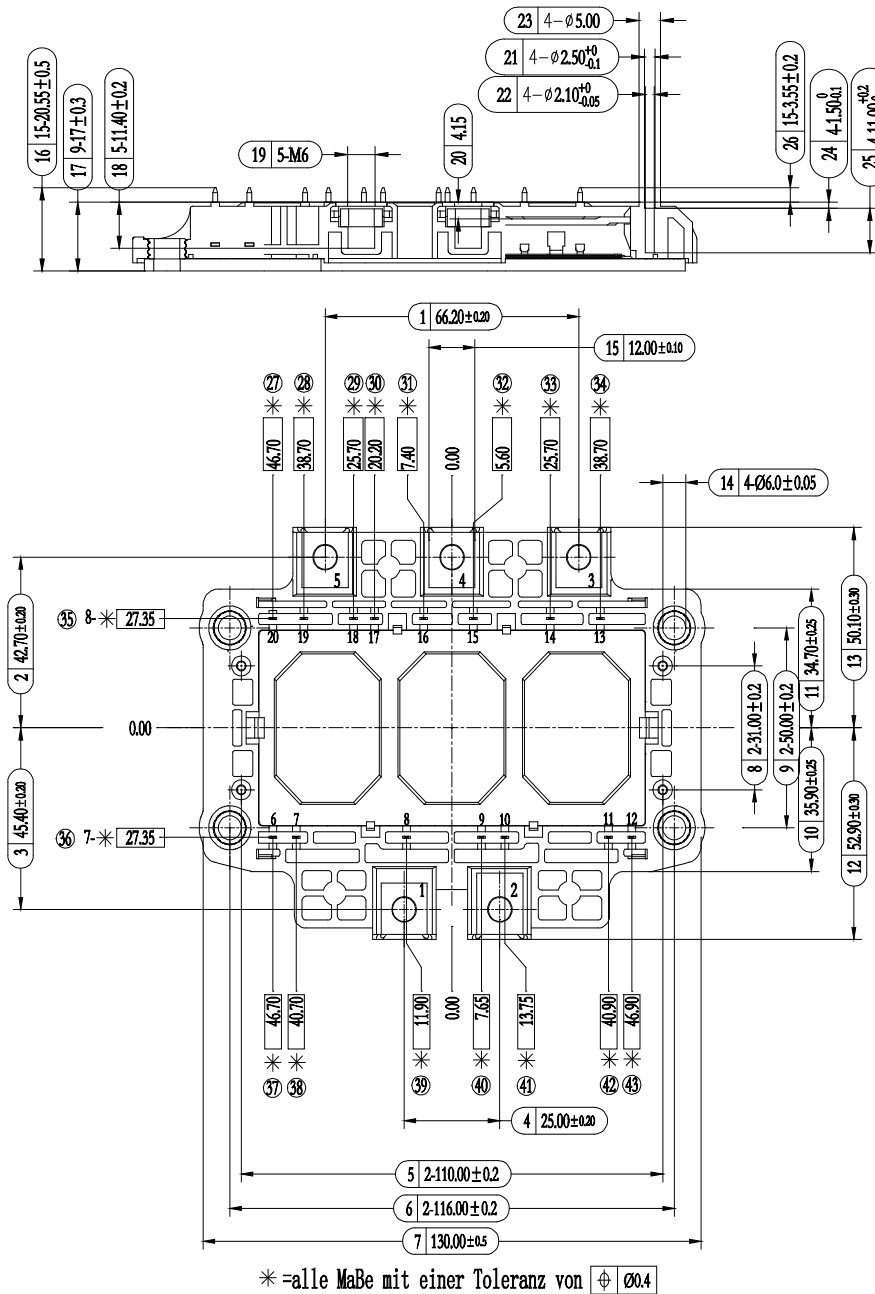


Figure 13. Circuit Diagram



* =alle Maße mit einer Toleranz von ± 0.04