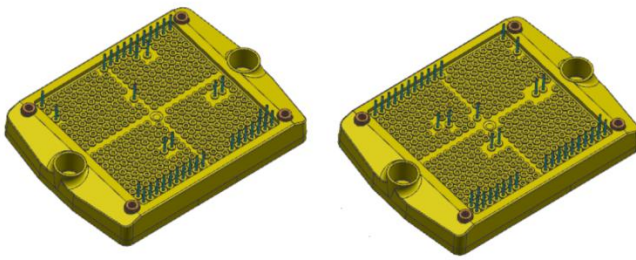




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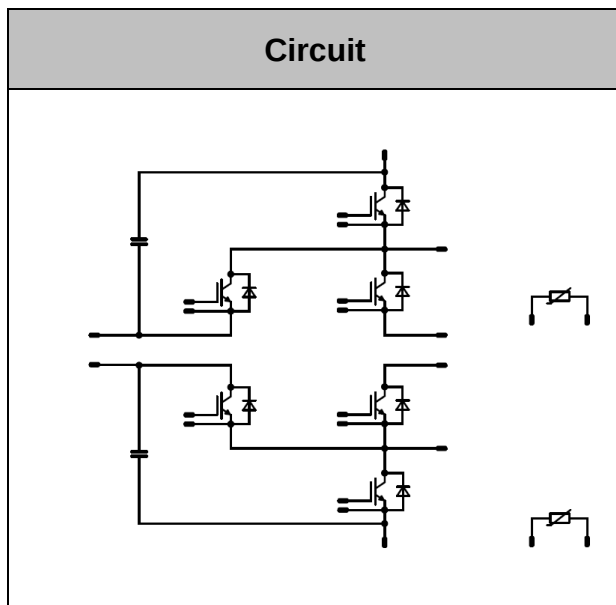


IGBT Modules

V_{CES}	950V
I_c	600A

Applications

- Solar Inverters
- Energy Storage Systems



Features

- Temperature sensor
- Advanced Neutral Point Clamped topology
- Integrated Capacitor
- Split topology
- Low collector emitter saturation voltage
- High speed and smooth switching



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● AC Switch

Absolute Maximum Ratings

Parameter	Symbol	Conditions	Value	Unit
Collector-Emitter Voltage	V_{CES}	$T_{vj}=25^{\circ}\text{C}$	950	V
Continuous DC Forward Current	I_C	$T_s=80^{\circ}\text{C}$	461	A
Repetitive Peak Collector Current	I_{CRM}	t_p limited by T_{vjmax}	800	A
Gate-Emitter Voltage	V_{GES}	$T_{vj}=25^{\circ}\text{C}$	± 20	V
Total Power Dissipation	P_{tot}	$T_s=80^{\circ}\text{C}$ $T_{vjmax}=175^{\circ}\text{C}$	630	W

● AC Switch

Characteristic Values

Parameter	Symbol	Conditions	Value			Unit
			Min.	Typ.	Max.	
Gate-Emitter Threshold Voltage	$V_{GE(th)}$	$V_{GE}=V_{CE}$, $I_C=6.5\text{mA}$, $T_{vj}=25^{\circ}\text{C}$	4.15	4.75	5.15	V
Collector-Emitter Cut-off Current	I_{CES}	$V_{CE}=950\text{V}$, $V_{GE}=0\text{V}$, $T_{vj}=25^{\circ}\text{C}$			8.00	μA
Collector-Emitter Saturation Voltage	$V_{CE(sat)}$	$I_C=400\text{A}$, $V_{GE}=15\text{V}$, $T_{vj}=25^{\circ}\text{C}$		1.35		V
		$I_C=400\text{A}$, $V_{GE}=15\text{V}$, $T_{vj}=125^{\circ}\text{C}$		1.38		
		$I_C=400\text{A}$, $V_{GE}=15\text{V}$, $T_{vj}=150^{\circ}\text{C}$		1.40		
Gate Charge	Q_G			3.18		μC
Input Capacitance	C_{ies}	$V_{CE}=25\text{V}$, $V_{GE}=0\text{V}$, $f=1\text{MHz}$, $T_{vj}=25^{\circ}\text{C}$		69.4		nF
Reverse Transfer Capacitance	C_{res}			0.38		nF
Internal Gate Resistance	R_{gint}			0.65		Ω
Gate-Emitter Leakage Current	I_{GES}	$V_{CE}=0\text{V}$, $V_{GE}=20\text{V}$, $T_{vj}=25^{\circ}\text{C}$			200	nA
Thermal Resistance Junction-to-Heatsink	$R_{\theta JH}$	$\lambda_{paste}=5.2\text{W/mK}$		0.15		K/W



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● AC Diode

Absolute Maximum Ratings

Parameter	Symbol	Conditions	Value	Unit
Peak Repetitive Reverse Voltage	V_{RRM}	$T_{vj}=25^{\circ}\text{C}$	950	V
Continuous DC Forward Current	I_F	$T_s=80^{\circ}\text{C}$	191	A
Repetitive Peak Forward Current	I_{FRM}	t_p limited by T_{vjmax}	600	A
Total Power Dissipation	P_{tot}	$T_s=80^{\circ}\text{C}$ $T_{vjmax}=175^{\circ}\text{C}$	365	W

● AC Diode

Characteristic Values

Parameter	Symbol	Conditions	Value			Unit
			Min.	Typ.	Max.	
Forward Voltage	V_F	$I_F=300\text{A}, T_{vj}=25^{\circ}\text{C}$		2.0		V
		$I_F=300\text{A}, T_{vj}=125^{\circ}\text{C}$		2.2		
		$I_F=300\text{A}, T_{vj}=150^{\circ}\text{C}$		2.3		
Reverse Leakage Current	I_R	$V_R=950\text{V}, T_{vj}=25^{\circ}\text{C}$		12.00		μA
Thermal Resistance Junction-to- Heatsink	$R_{\theta JH}$	$\lambda_{paste}=5.2\text{W/mK}$		0.26		K/W



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● Neutral Point Switch

Absolute Maximum Ratings

Parameter	Symbol	Conditions	Value	Unit
Collector-Emitter Voltage	V_{CES}	$T_{vj}=25^{\circ}\text{C}$	950	V
Continuous DC Forward Current	I_C	$T_s=80^{\circ}\text{C}$	282	A
Repetitive Peak Collector Current	I_{CRM}	t_p limited by T_{vjmax}	800	A
Gate-Emitter Voltage	V_{GES}	$T_{vj}=25^{\circ}\text{C}$	± 20	V
Total Power Dissipation	P_{tot}	$T_s=80^{\circ}\text{C}$ $T_{vjmax}=175^{\circ}\text{C}$	539	W

Characteristic Values

Parameter	Symbol	Conditions	Value			Unit
			Min.	Typ.	Max.	
Gate-Emitter Threshold Voltage	$V_{GE(th)}$	$V_{GE}=V_{CE}$, $I_C=6.5\text{mA}$, $T_{vj}=25^{\circ}\text{C}$	4.10	4.75	5.15	V
Collector-Emitter Cut-off Current	I_{CES}	$V_{CE}=950\text{V}$, $V_{GE}=0\text{V}$, $T_{vj}=25^{\circ}\text{C}$			8.00	μA
Collector-Emitter Saturation Voltage	$V_{CE(sat)}$	$I_C=400\text{A}$, $V_{GE}=15\text{V}$, $T_{vj}=25^{\circ}\text{C}$		1.88		V
		$I_C=400\text{A}$, $V_{GE}=15\text{V}$, $T_{vj}=125^{\circ}\text{C}$		2.05		
		$I_C=400\text{A}$, $V_{GE}=15\text{V}$, $T_{vj}=150^{\circ}\text{C}$		2.15		
Internal Gate Resistance	R_{gint}			0.65		Ω
Input Capacitance	C_{ies}	$V_{CE}=25\text{V}$, $V_{GE}=0\text{V}$, $f=1\text{MHz}$, $T_{vj}=25^{\circ}\text{C}$		28.6		nF
Reverse Transfer Capacitance	C_{res}			0.15		nF
Gate Charge	Q_G			1.7		μC
Gate-Emitter Leakage Current	I_{GES}	$V_{CE}=0\text{V}$, $V_{GE}=20\text{V}$, $T_{vj}=25^{\circ}\text{C}$			200	nA
Turn-on Delay Time	$t_{d(on)}$	$I_C=400\text{A}$ $V_{CE}=500\text{V}$ $V_{GE}=\pm 15\text{V}$ $R_G=2\Omega$ $L_S=120\text{nH}$ $T_{vj}=25^{\circ}\text{C}$		44		ns
Rise Time	t_r			13		ns
Turn-off Delay Time	$t_{d(off)}$			34		ns
Fall Time	t_f			17		ns
Energy Dissipation During Turn-on Time	E_{on}			15.4		mJ
Energy Dissipation During Turn-off Time	E_{off}			16		mJ



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Turn-on Delay Time	$t_{d(on)}$	$I_C=400A$ $V_{CE}= 500V$ $V_{GE}=\pm 15V$ $R_G=2\Omega$ $L_s=120nH$ $T_{vj}=125^\circ C$		61		ns
Rise Time	t_r			23		ns
Turn-off Delay Time	$t_{d(off)}$			46		ns
Fall Time	t_f			26		ns
Energy Dissipation During Turn-on Time	E_{on}			20.4		mJ
Energy Dissipation During Turn-off Time	E_{off}			19.5		mJ
Turn-on Delay Time	$t_{d(on)}$	$I_C=400A$ $V_{CE}= 500V$ $V_{GE}=\pm 15V$ $R_G=2\Omega$ $L_s=120nH$ $T_{vj}=150^\circ C$		70		ns
Rise Time	t_r			29		ns
Turn-off Delay Time	$t_{d(off)}$			58		ns
Fall Time	t_f			33		ns
Energy Dissipation During Turn-on Time	E_{on}			25.6		mJ
Energy Dissipation During Turn-off Time	E_{off}			23.1		mJ
Thermal Resistance Junction-to- Heatsink	$R_{\theta JH}$	$\lambda_{paste}=5.2W/mK$		0.18		K/W

● Neutral Point Diode



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Absolute Maximum Ratings

Parameter	Symbol	Conditions	Value	Unit
Repetitive Peak Reverse Voltage	V_{RRM}	$T_{vj}=25^{\circ}\text{C}$	1200	V
Continuous DC Forward Current	I_F	$T_s=80^{\circ}\text{C}$	171	A
Repetitive Peak Forward Current	I_{FRM}	t_p limited by T_{vjmax}	728	A
Surge (non-repetitive) forward current	I_{FSM}	Single Half Sine Wave, $t_p=10\text{ms}$, $T_{vj}=25^{\circ}\text{C}$	1040	A
Total Power Dissipation	P_{tot}	$T_s=80^{\circ}\text{C}$ $T_{vjmax}=175^{\circ}\text{C}$	431	W

Characteristic Values

Parameter	Symbol	Conditions	Value			Unit
			Min.	Typ.	Max.	
Forward Voltage	V_F	$I_F=160\text{A}$, $T_{vj}=25^{\circ}\text{C}$		1.45		V
		$I_F=160\text{A}$, $T_{vj}=125^{\circ}\text{C}$		1.85		
		$I_F=160\text{A}$, $T_{vj}=150^{\circ}\text{C}$		2.0		
Reverse Leakage Current	I_R	$V_R=1200\text{V}$, $T_{vj}=25^{\circ}\text{C}$		0.28	1.6	mA
Recovered Charge	Q_{rr}	$I_F=400\text{A}$		29.3		uC
Peak Reverse Recovery Current	I_{rr}	$V_R=500\text{V}$ $-di_F/dt=3000\text{A/us}$		190		A
Reverse Recovery Energy	E_{rec}	$T_{vj}=25^{\circ}\text{C}$		25.3		mJ
Recovered Charge	Q_{rr}	$I_F=400\text{A}$		37.8		uC
Peak Reverse Recovery Current	I_{rr}	$V_R=500\text{V}$ $-di_F/dt=3000\text{A/us}$		205		A
Reverse Recovery Energy	E_{rec}	$T_{vj}=125^{\circ}\text{C}$		31.5		mJ
Recovered Charge	Q_{rr}	$I_F=400\text{A}$		45.6		uC
Peak Reverse Recovery Current	I_{rr}	$V_R=500\text{V}$ $-di_F/dt=3000\text{A/us}$		217		A
Reverse Recovery Energy	E_{rec}	$T_{vj}=150^{\circ}\text{C}$		37.7		mJ
Thermal Resistance Junction-to- Heatsink	$R_{\theta JH}$	$\lambda_{paste}=5.2\text{W/mK}$		0.22		K/W

● DC-Link Switch



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Absolute Maximum Ratings

Parameter	Symbol	Conditions	Value	Unit
Collector-Emitter Voltage	V_{CES}	$T_{vj}=25^{\circ}\text{C}$	950	V
Continuous DC Forward Current	I_C	$T_s=80^{\circ}\text{C}$	382	A
Repetitive Peak Collector Current	I_{CRM}	t_p limited by T_{vjmax}	1200	A
Gate-Emitter Voltage	V_{GES}	$T_{vj}=25^{\circ}\text{C}$	± 20	V
Total Power Dissipation	P_{tot}	$T_s=80^{\circ}\text{C}$ $T_{vjmax}=175^{\circ}\text{C}$	704	W

Characteristic Values

Parameter	Symbol	Conditions	Value			Unit
			Min.	Typ.	Max.	
Gate-Emitter Threshold Voltage	$V_{GE(th)}$	$V_{GE}=V_{CE}$, $I_C=9.8\text{mA}$, $T_{vj}=25^{\circ}\text{C}$	4.15	4.75	5.20	V
Collector-Emitter Cut-off Current	I_{CES}	$V_{CE}=950\text{V}$, $V_{GE}=0\text{V}$, $T_{vj}=25^{\circ}\text{C}$			12.00	μA
Collector-Emitter Saturation Voltage	$V_{CE(sat)}$	$I_C=600\text{A}$, $V_{GE}=15\text{V}$, $T_{vj}=25^{\circ}\text{C}$		1.90		V
		$I_C=600\text{A}$, $V_{GE}=15\text{V}$, $T_{vj}=125^{\circ}\text{C}$		2.20		
		$I_C=600\text{A}$, $V_{GE}=15\text{V}$, $T_{vj}=150^{\circ}\text{C}$		2.30		
Gate Charge	Q_G			2.6		μC
Input Capacitance	C_{ies}	$V_{CE}=25\text{V}$, $V_{GE}=0\text{V}$, $f=1\text{MHz}$, $T_{vj}=25^{\circ}\text{C}$		42.9		nF
Reverse Transfer Capacitance	C_{res}			0.23		nF
Internal Gate Resistance	R_{gint}			0.65		Ω
Gate-Emitter Leakage Current	I_{GES}	$V_{CE}=0\text{V}$, $V_{GE}=20\text{V}$, $T_{vj}=25^{\circ}\text{C}$			300	nA
Turn-on Delay Time	$t_{d(on)}$	$I_C=600\text{A}$ $V_{CE}=500\text{V}$ $V_{GE}=\pm 15\text{V}$ $R_G=2\Omega$ $L_S=120\text{nH}$ $T_{vj}=25^{\circ}\text{C}$		38		ns
Rise Time	t_r			14		ns
Turn-off Delay Time	$t_{d(off)}$			36		ns
Fall Time	t_f			19		ns
Energy Dissipation During Turn-on Time	E_{on}			17.9		mJ
Energy Dissipation During Turn-off Time	E_{off}			13.5		mJ



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Turn-on Delay Time	$t_{d(on)}$	$I_C=600A$ $V_{CE}=500V$ $V_{GE}=\pm 15V$ $R_G=2\Omega$ $L_S=120nH$ $T_{vj}=125^\circ C$		49		ns
Rise Time	t_r			22		ns
Turn-off Delay Time	$t_{d(off)}$			46		ns
Fall Time	t_f			28		ns
Energy Dissipation During Turn-on Time	E_{on}			22.5		mJ
Energy Dissipation During Turn-off Time	E_{off}			15.9		mJ
Turn-on Delay Time	$t_{d(on)}$	$I_C=600A$ $V_{CE}=500V$ $V_{GE}=\pm 15V$ $R_G=2\Omega$ $L_S=120nH$ $T_{vj}=150^\circ C$		54		ns
Rise Time	t_r			29		ns
Turn-off Delay Time	$t_{d(off)}$			61		ns
Fall Time	t_f			34		ns
Energy Dissipation During Turn-on Time	E_{on}			27.3		mJ
Energy Dissipation During Turn-off Time	E_{off}			18.7		mJ
Thermal Resistance Junction-to- Heatsink	$R_{\theta JH}$	$\lambda_{paste}=5.2W/mK$		0.18		K/W



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● DC-Link Diode

Absolute Maximum Ratings

Parameter	Symbol	Conditions	Value	Unit
Repetitive Peak Reverse Voltage	V_{RRM}	$T_{vj}=25^{\circ}\text{C}$	950	V
Continuous DC Forward Current	I_F	$T_s=80^{\circ}\text{C}$	191	A
Repetitive Peak Forward Current	I_{FRM}	t_p limited by T_{vjmax}	600	A
Total Power Dissipation	P_{tot}	$T_s=80^{\circ}\text{C}$ $T_{vjmax}=175^{\circ}\text{C}$	365	W

Characteristic Values

Parameter	Symbol	Conditions	Value			Unit
			Min.	Typ.	Max.	
Forward Voltage	V_F	$I_F=300\text{A}, T_{vj}=25^{\circ}\text{C}$		2.00		V
		$I_F=300\text{A}, T_{vj}=125^{\circ}\text{C}$		2.18		
		$I_F=300\text{A}, T_{vj}=150^{\circ}\text{C}$		2.25		
Reverse Leakage Current	I_R	$V_r=950\text{V}, T_{vj}=25^{\circ}\text{C}$			12.00	μA
Recovered Charge	Q_{rr}	$I_F=600\text{A}$		33.5		μC
Peak Reverse Recovery Current	I_{rr}	$V_R=500\text{V}$ $-di_F/dt=3500\text{A}/\mu\text{s}$		197		A
Reverse Recovery Energy	E_{rec}	$T_{vj}=25^{\circ}\text{C}$		26.8		mJ
Recovered Charge	Q_{rr}	$I_F=600\text{A}$		45.8		μC
Peak Reverse Recovery Current	I_{rr}	$V_R=500\text{V}$ $-di_F/dt=3500\text{A}/\mu\text{s}$		209		A
Reverse Recovery Energy	E_{rec}	$T_{vj}=125^{\circ}\text{C}$		33.5		mJ
Recovered Charge	Q_{rr}	$I_F=600\text{A}$		53.7		μC
Peak Reverse Recovery Current	I_{rr}	$V_R=500\text{V}$ $-di_F/dt=3500\text{A}/\mu\text{s}$		214		A
Reverse Recovery Energy	E_{rec}	$T_{vj}=150^{\circ}\text{C}$		39.6		mJ
Thermal Resistance Junction-to- Heatsink	$R_{\theta JH}$	$\lambda_{paste}=5.2\text{W}/\text{mK}$		0.26		K/W



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● DC link Capacitor

Characteristic Values

Parameter	Symbol	Conditions	Value			Unit
			Min.	Typ.	Max.	
C value	C			44		nF

● NTC Thermistor

Characteristic Values

Parameter	Symbol	Conditions	Value			Unit
			Min.	Typ.	Max.	
Rated Resistance	R ₂₅			22		kΩ
Deviation of R100	ΔR/R	T _C =100℃, R ₁₀₀ =1484Ω	-5		5	%
Power Dissipation	P ₂₅			130		mW
B-Value	B _{25/50}	$R_2=R_{25}\exp[B_{25/50}(1/T_2-1/(298.15K))]$		3962		K

● Module Characteristics

T_C=25℃ unless otherwise specified

Parameter	Symbol	Conditions	Value			Unit
			Min.	Typ.	Max.	
Isolation Voltage	V _{isol}	t=1min, f=50Hz	3200			V
Creepage Distance	d _{Creep}	terminal to heatsink	12.7			mm
Clearance		MG600TLU095MSN4		11.99		mm
		MG600TLL095MSN4		11.39		mm
Storage Temperature	T _{stg}		-40		125	℃
Operating Junction Temperature	T _{vjop}		-40		150	℃
Comparative Tracking Index	CTI		600			

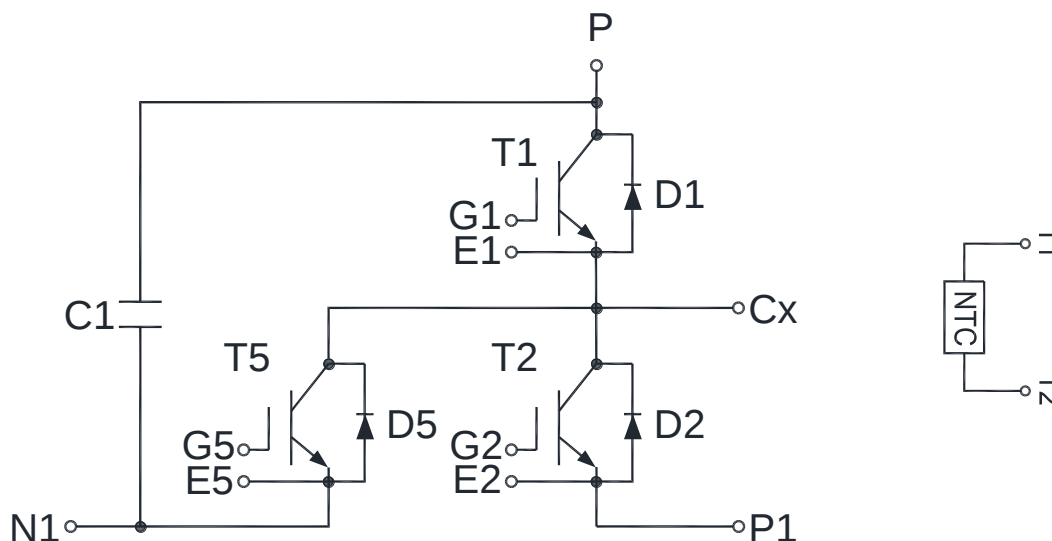


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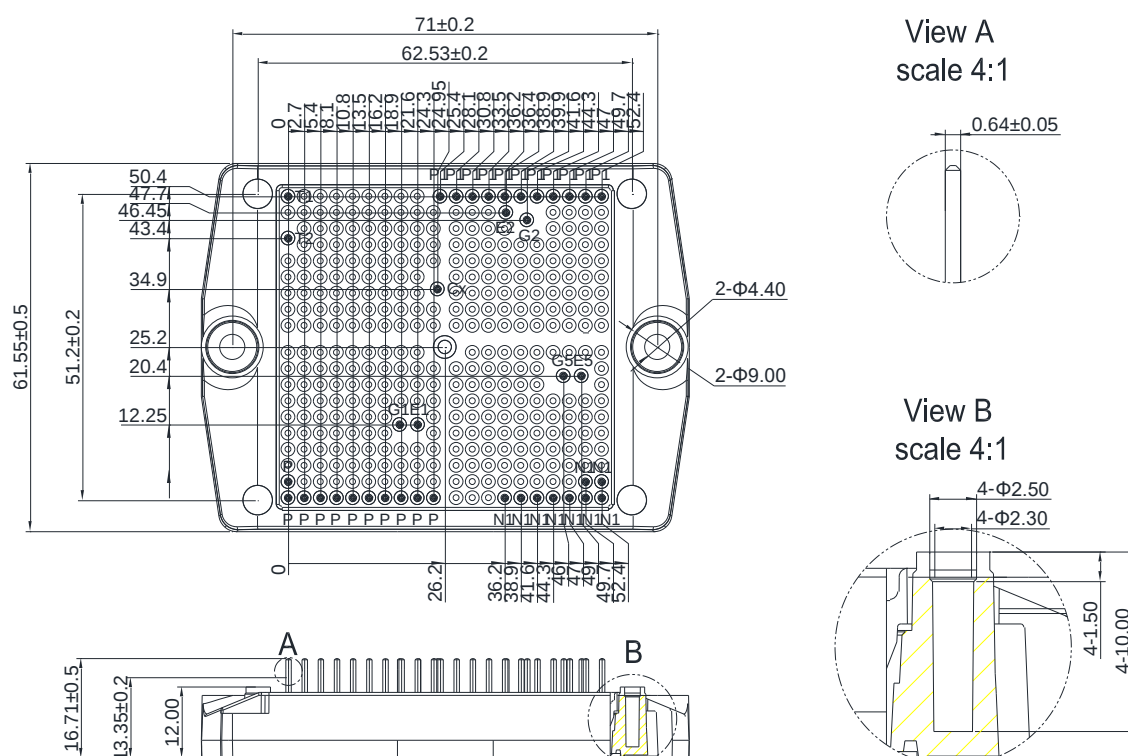
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Circuit Diagram-MG600TLU095MSN4



Package Dimensions-MG600TLU095MSN4



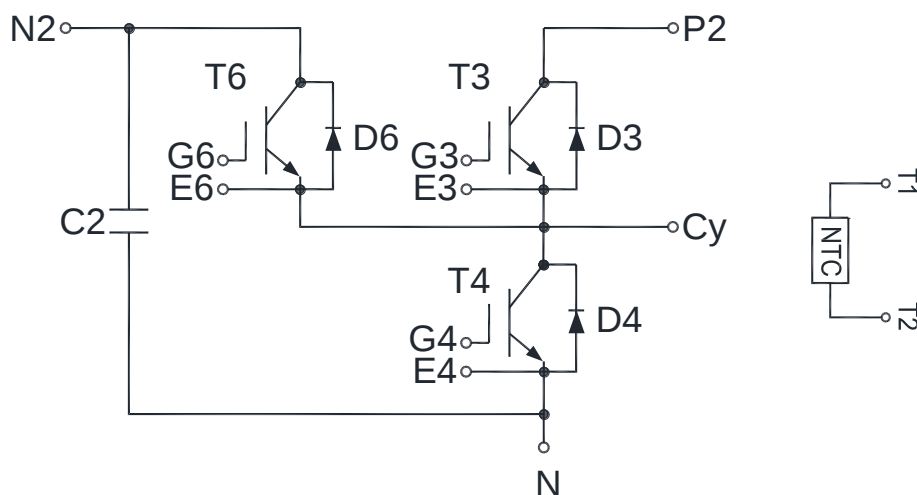


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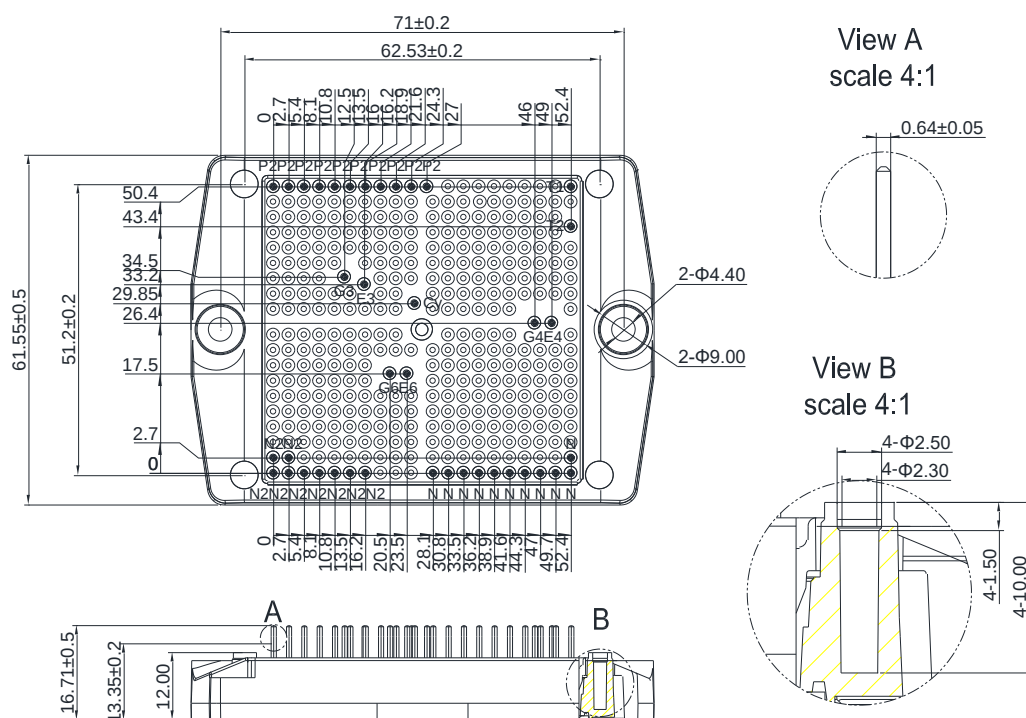
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Circuit Diagram-MG600TLL95MSN4



Package Dimensions-MG600TLL95MSN4





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IGBTs is the device which is sensitive to the static electricity, it is necessary to protect the device from being damaged by the static electricity when using it.

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