

Key Parameters

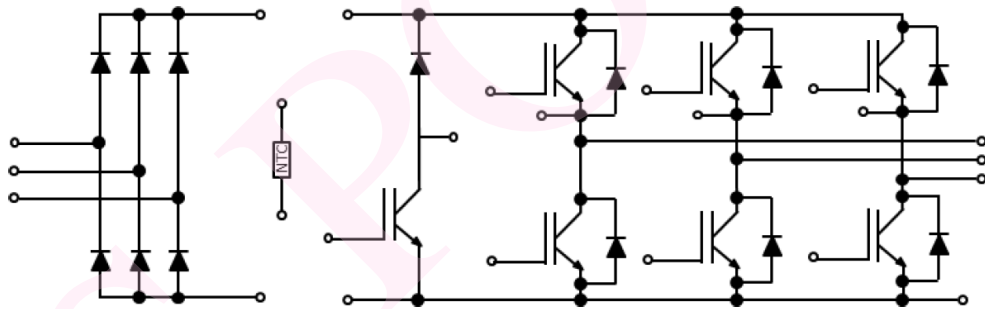
V_{CES} = 1200V
 I_c = 25A

Features

- Low $V_{ce(sat)}$
- Fast switching
- High ruggedness
- High short circuit capability

Applications

- Inverter for motor drive
- Frequency converters
- Servos
- General purpose Inverters



Equivalent Circuit Schematic

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Absolute Maximum Ratings: IGBT, Inverter						
Symbol	Characteristic	Value	Unit			
V_{CES}	Collector-Emitter Voltage	1200	V			
I_{CDC}	Continuous DC Collector Current ($T_C=100^{\circ}C, T_J=175^{\circ}C$)	25	A			
I_{CRM}	Peak Collector Current ($t_p=1ms$)	50	A			
V_{GES}	Gate-Emitter Voltage	± 20	V			
IGBT Characteristics						
Symbol	Characteristic	Conditions	Value			Unit
			Min.	Typ.	Max.	
BV_{CES}	Collector-Emitter breakdown Voltage	$V_{GE}=0V, I_C=250\mu A, T_{vj}=25^{\circ}C$	1200			V
I_{CES}	Collector-Emitter leakage Current	$V_{CE}=1200V, V_{GE}=0V, T_{vj}=25^{\circ}C$			1.0	mA
I_{GES}	Gate-Emitter leakage Current	$V_{CE}=0V, V_{GE}=\pm 20V, T_{vj}=25^{\circ}C$			100	ηA
$V_{GE(th)}$	Gate-emitter Threshold Voltage	$V_{GE}=V_{CE}, I_C=600\mu A, T_{vj}=25^{\circ}C$	5.5	6.5	7.5	V
$V_{CE(sat)}$	Collector-Emitter Saturation Voltage	$I_C=25A, V_{GE}=15V, T_{vj}=25^{\circ}C$		1.85	2.2	V
		$I_C=25A, V_{GE}=15V, T_{vj}=125^{\circ}C$		2.3		V
		$I_C=25A, V_{GE}=15V, T_{vj}=150^{\circ}C$		2.4		V
Q_G	Gate Charge	$V_{CC}=600V, V_{GE}=15V, I_C=25A, T_{vj}=25^{\circ}C$		105		ηC
C_{iss}	Input Capacitance	$V_{CE}=25V, V_{GE}=0V, f=1MHz, T_{vj}=25^{\circ}C$		1980		pF
C_{oss}	Output Capacitance			110		pF
C_{rss}	Reverse Transfer Capacitance			20		pF
$t_{d(on)}$	Turn-on Delay Time	$I_C=25A, V_{CE}=600V, V_{GE}=\pm 15V, R_G=15\Omega, T_{vj}=25^{\circ}C, L_{load}=0.82mH$ Energy loss include tail and diode reverse recovery		28		ηs
t_r	Rise Time			34		ηs
$t_{d(off)}$	Turn-off Delay Time			182		ηs
t_f	Fall Time			141		ηs
E_{on}	Energy Dissipation During Turn-on Time			1.56		mJ
E_{off}	Energy Dissipation During Turn-off Time			1.23		mJ
$t_{d(on)}$	Turn-on Delay Time		$I_C=25A, V_{CE}=600V, V_{GE}=\pm 15V, R_G=15\Omega, T_{vj}=150^{\circ}C, L_{load}=0.82mH$ Energy loss include tail and diode reverse recovery		26	
t_r	Rise Time			28		ηs
$t_{d(off)}$	Turn-off Delay Time			174		ηs
t_f	Fall Time			238		ηs
E_{on}	Energy Dissipation During Turn-on Time			3.48		mJ
E_{off}	Energy Dissipation During Turn-off Time			1.81		mJ
$I_{C(SC)}$	SC Data	$t_{sc}\leq 10\mu s, V_{GE}=15V, T_{vj}=25^{\circ}C, V_{CC}\leq 600V,$			85	
Absolute Maximum Ratings: Diode, Inverter						
Symbol	Characteristic	Value	Unit			
V_{RRM}	Repetitive peak reverse voltage	1200	V			
I_F	Continuous DC forward current ($T_C=100^{\circ}C, T_J=150^{\circ}C$)	25	A			
I_{FRM}	Repetitive peak forward current ($t_p=1ms$)	50	A			
Diode Characteristics						
Symbol	Characteristic	Conditions	Value			Unit
			Min.	Typ.	Max.	
V_F	Forward Voltage	$I_F=25A, T_{vj}=25^{\circ}C$		2.1	2.5	V
		$I_F=25A, T_{vj}=125^{\circ}C$		1.75		V
		$I_F=25A, T_{vj}=150^{\circ}C$		1.7		V
Q_{rr}	Recovered Charge	$I_F=25A, V_R=600V$		1.55		μC
I_{rrm}	Peak Reverse Recovery Current	$-di_F/dt=588A/\mu s, T_{vj}=25^{\circ}C$		20		A
E_{rr}	Reverse Recovery Energy			0.5		mJ
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Absolute Maximum Ratings: IGBT, Break-Chopper							
Symbol	Characteristic	Value	Unit				
V _{CES}	Collector-Emitter Voltage	1200	V				
I _{CDC}	Continuous DC Collector Current (T _C =100°C, T _J =175°C)	25	A				
I _{CRM}	Peak Collector Current (tp=1ms)	50	A				
V _{GES}	Gate-Emitter Voltage	±20	V				
IGBT Characteristics							
Symbol	Characteristic	Conditions	Value			Unit	
			Min.	Typ.	Max.		
BV _{CES}	Collector-Emitter breakdown Voltage	V _{GE} =0V, I _C =250μA, T _{vj} =25°C	1200			V	
I _{CES}	Collector-Emitter leakage Current	V _{CE} =1200V, V _{GE} =0V, T _{vj} =25°C			1.0	mA	
I _{GES}	Gate-Emitter leakage Current	V _{CE} =0V, V _{GE} =±20V, T _{vj} =25°C			100	ηA	
V _{GE(th)}	Gate-emitter Threshold Voltage	V _{GE} =V _{CE} , I _C =600μA, T _{vj} =25°C	5.5	6.5	7.5	V	
V _{CE(sat)}	Collector-Emitter Saturation Voltage	I _C =25A, V _{GE} =15V, T _{vj} =25°C		1.85	2.2	V	
		I _C =25A, V _{GE} =15V, T _{vj} =125°C		2.3		V	
		I _C =25A, V _{GE} =15V, T _{vj} =150°C		2.4		V	
Q _G	Gate Charge	V _{CC} =600V, V _{GE} =15V, I _C =25A T _{vj} =25°C		105		ηC	
C _{iss}	Input Capacitance	V _{CE} =25V, V _{GE} =0V, f=1MHz, T _{vj} =25°C		1980		pF	
C _{oss}	Output Capacitance			110		pF	
C _{rss}	Reverse Transfer Capacitance			20		pF	
t _{d(on)}	Turn-on Delay Time	I _C =25A V _{CE} = 600 V V _{GE} =±15V R _G = 15Ω T _{vj} =25°C , L _{load} =0.82mH Energy loss include tail and diode reverse recovery		34		ηs	
t _r	Rise Time			33		ηs	
t _{d(off)}	Turn-off Delay Time			132		ηs	
t _f	Fall Time			134		ηs	
E _{on}	Energy Dissipation During Turn-on Time			1.22		mJ	
E _{off}	Energy Dissipation During Turn-off Time			1.18		mJ	
t _{d(on)}	Turn-on Delay Time		I _C =25A V _{CE} = 600 V V _{GE} =±15V R _G = 15Ω T _{vj} =150°C , L _{load} =0.82mH Energy loss include tail and diode reverse recovery		33		ηs
t _r	Rise Time				32		ηs
t _{d(off)}	Turn-off Delay Time			184		ηs	
t _f	Fall Time			237		ηs	
E _{on}	Energy Dissipation During Turn-on Time			2.93		mJ	
E _{off}	Energy Dissipation During Turn-off Time			1.92		mJ	
Absolute Maximum Ratings: Diode, Break-Chopper							
Symbol	Characteristic	Value		Unit			
V _{RRM}	Repetitive peak reverse voltage	1200	V				
I _F	Continuous DC forward current	10	A				
I _{FRM}	Repetitive peak forward current (tp=1ms)	20	A				
Diode Characteristics							
Symbol	Characteristic	Conditions	Value			Unit	
			Min.	Typ.	Max.		
V _F	Forward Voltage	I _F =10A, T _{vj} =25°C		2.2	2.65	V	
		I _F =10A, T _{vj} =125°C		1.8		V	
		I _F =10A, T _{vj} =150°C		1.7		V	
Q _{rr}	Recovered Charge	I _F =25A		0.99		μC	
I _{rrm}	Peak Reverse Recovery Current	V _R =600V		21		A	
E _{rr}	Reverse Recovery Energy	-di _F /dt =602A/μs T _{vj} =25°C		0.27		mJ	
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Absolute Maximum Ratings: Diode, Rectifier						
Symbol	Characteristic	Value				Unit
V _{RRM}	Repetitive peak reverse voltage	1600				V
I _{F(AV)}	Average output current 50/60Hz, sine wave (T _C =100°C)	25				A
I _{RMSM}	Maximum RMS current at rectifier output (T _C =100°C)	50				A
I _{FSM}	Surge forward current (V _R =0V, t _p =10msec)	250				A
I ² t	I ² t value (V _R =0V, t _p =10msec)	312				A ² s
Diode Characteristics						
Symbol	Characteristic	Conditions	Value			Unit
			Min.	Typ.	Max.	
V _F	Forward Voltage	I _F =25A, T _{vj} =150°C		1.3		V
I _R	Diode reverse current	V _R =1600V, T _j =150°C			2.0	mA
Module Characteristics						
Symbol	Characteristic	Conditions	Value			Unit
			Min.	Typ.	Max.	
V _{isol}	Isolation voltage	t=1min, f=50Hz	2500			V
T _{jmax}	Maximum Junction Temperature				175	°C
T _{vj op}	Operating Junction Temperature		-40		150	°C
T _{stg}	Storage Temperature		-40		150	°C
R _{CC'+EE'}	Module lead resistance terminal to chip			4.0		mΩ
R _{AA'+CC'}	Module lead resistance terminal to chip			3.0		mΩ
L _{SCE}	Stray Inductance, Module			35		nH
R _{θjc}	Junction-to Case	per IGBT-inverter		0.64		°C/W
		per Diode-inverter		1.05		°C/W
		per IGBT-Break Chopper		0.64		°C/W
		per Diode- Break Chopper		1.55		°C/W
		per Diode- Rectifier		0.83		°C/W
R _{θcs}	Case to Sink	per IGBT-inverter		0.46		°C/W
		per Diode-inverter		0.86		°C/W
		per IGBT-Break Chopper		0.46		°C/W
		per Diode- Break Chopper		1.15		°C/W
		per Diode- Rectifier		0.92		°C/W
		per Module		0.02		°C/W
M _t	Module to heatsink torque		3.0		6.0	Nm
G	Weight of Module			180		g
NTC thermistors Characteristics						
Symbol	Characteristic	Conditions	Min.	Typ.	Max.	Unit
R ₂₅	Rated resistance			5.0		kΩ
ΔR/R	Deviation of R100	T _C =100°C, R ₁₀₀ =493.3Ω	-5		5	%
P ₂₅	Power Dissipation				20.0	mW
B _{25/50}	B-value	R ₂ =R ₂₅ exp[B _{25/50} (1/T ₂ -1/(298.15K))]		3375		K
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• **Typical Electrical Characteristics**

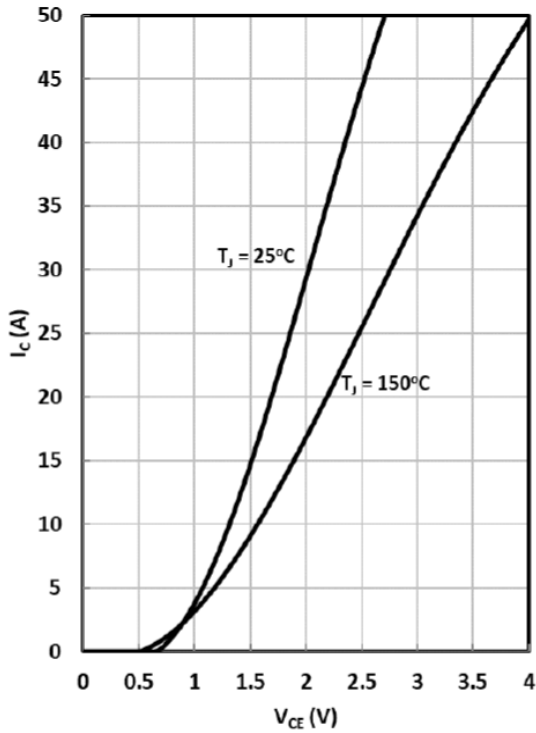


Fig. 1 IGBT (Inverter) Output Characteristics

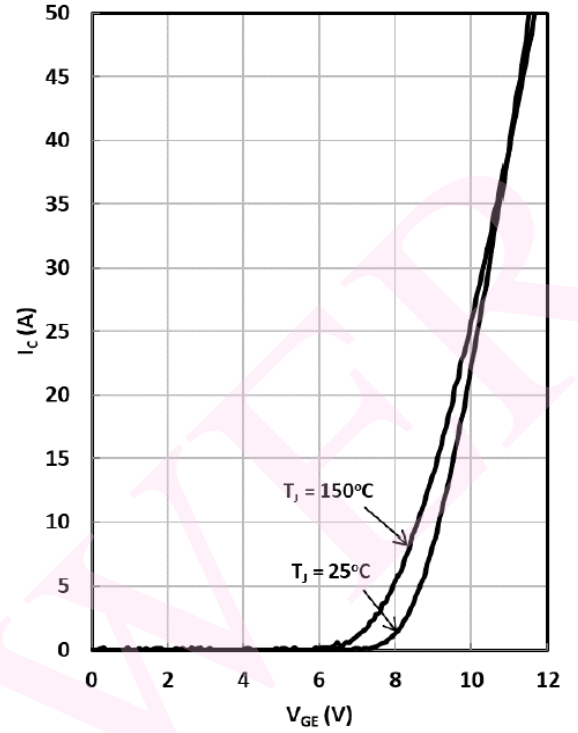


Fig. 2 IGBT (Inverter) Transfer Characteristics

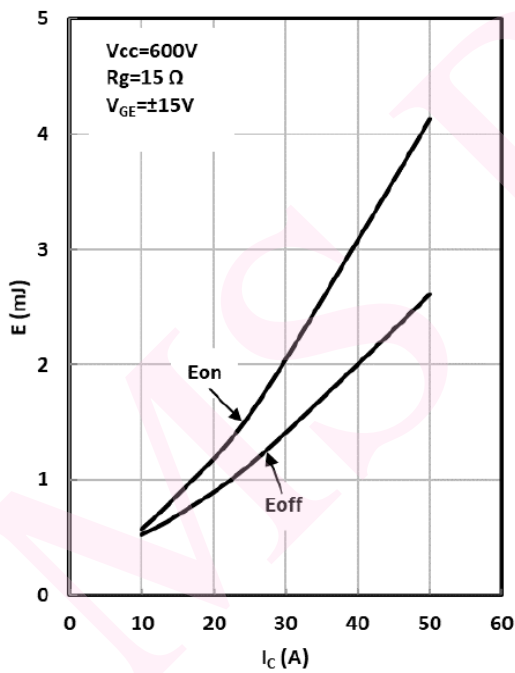


Fig. 3 IGBT (Inverter) Switching Loss vs. Ic

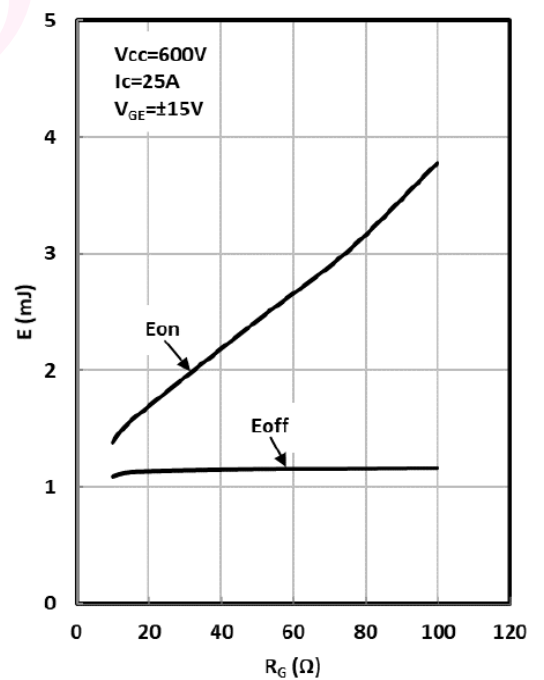


Fig. 4 IGBT (Inverter) Switching Loss vs. Rg

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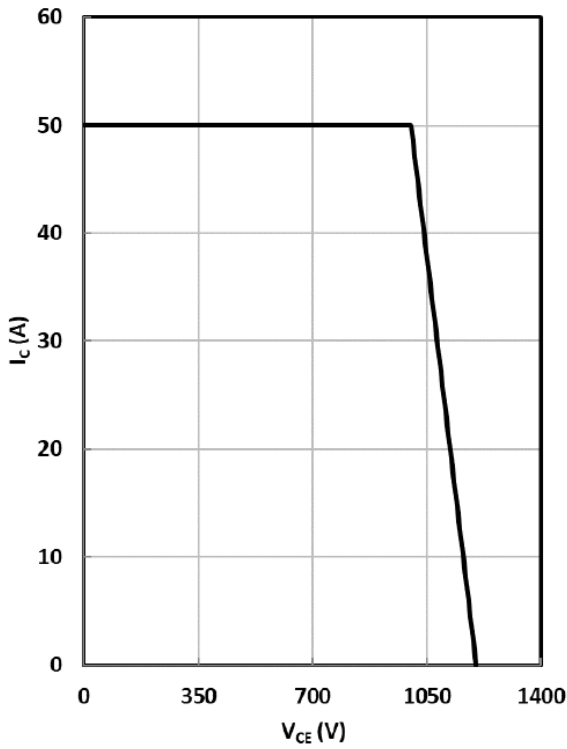


Fig. 5 RBSOA

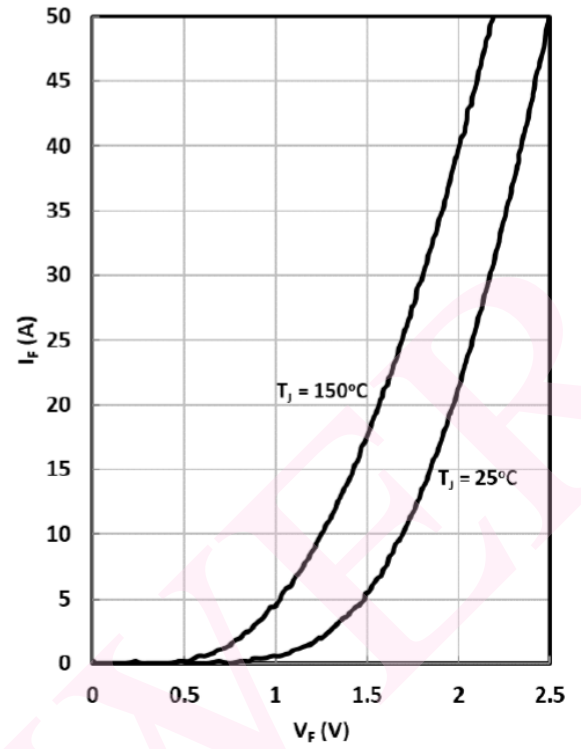


Fig. 6 Diode (Inverter) Forward Characteristics

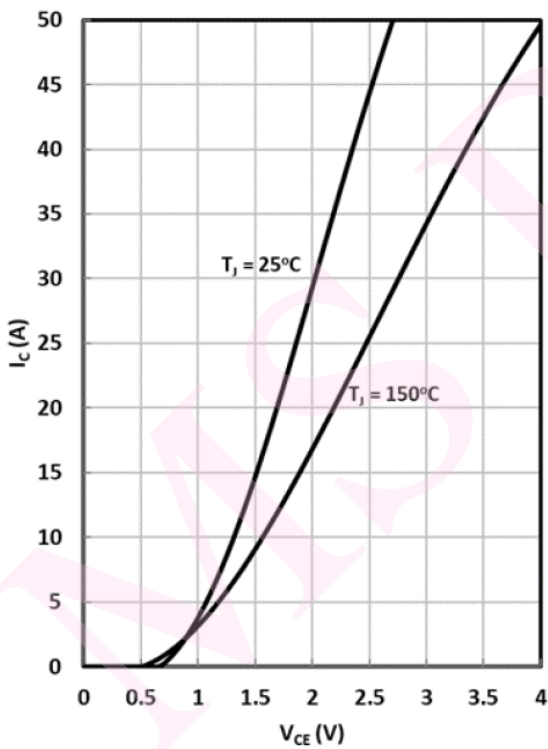


Fig. 7 IGBT (Brake-Chopper) Output Characteristics

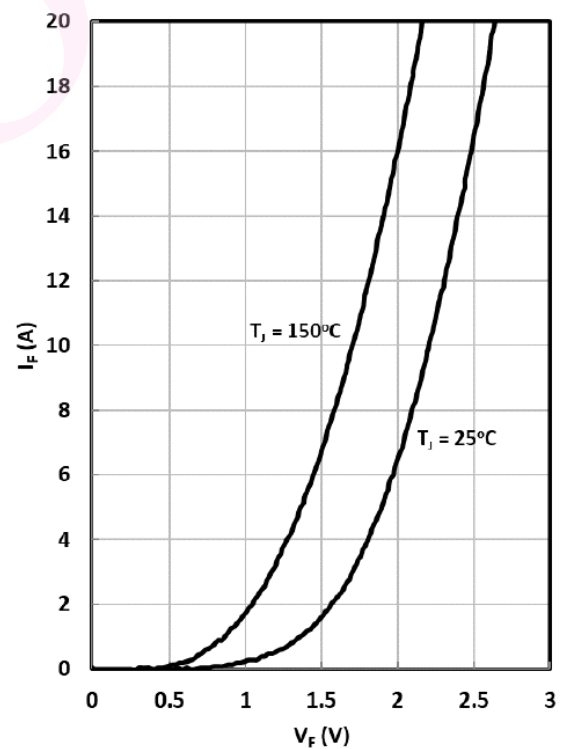


Fig. 8 Diode (Brake-Chopper) Output Characteristics

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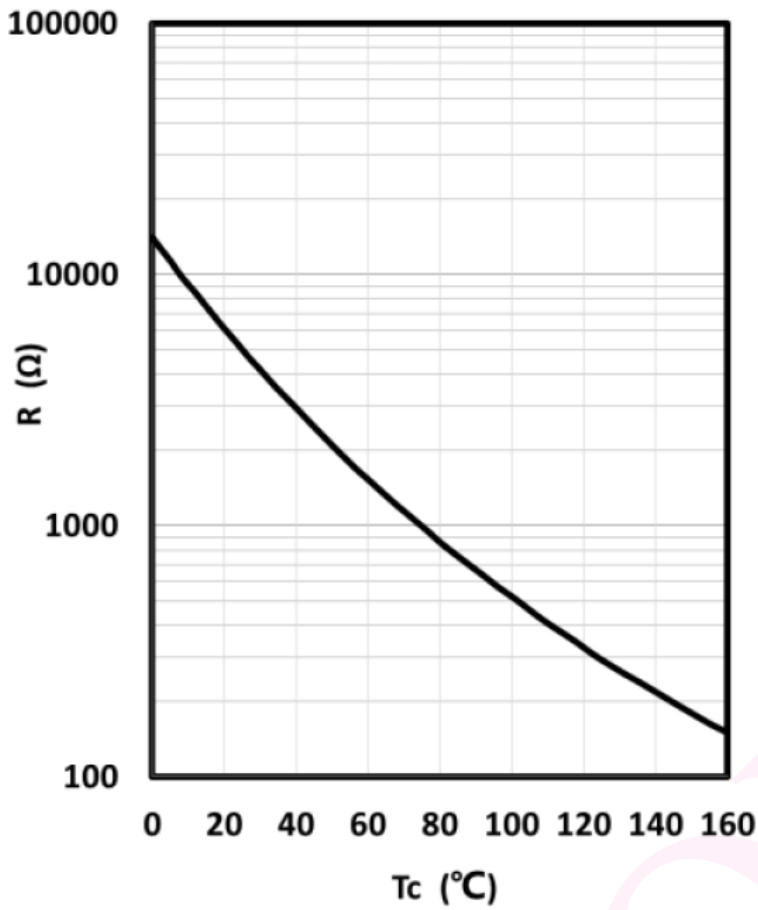
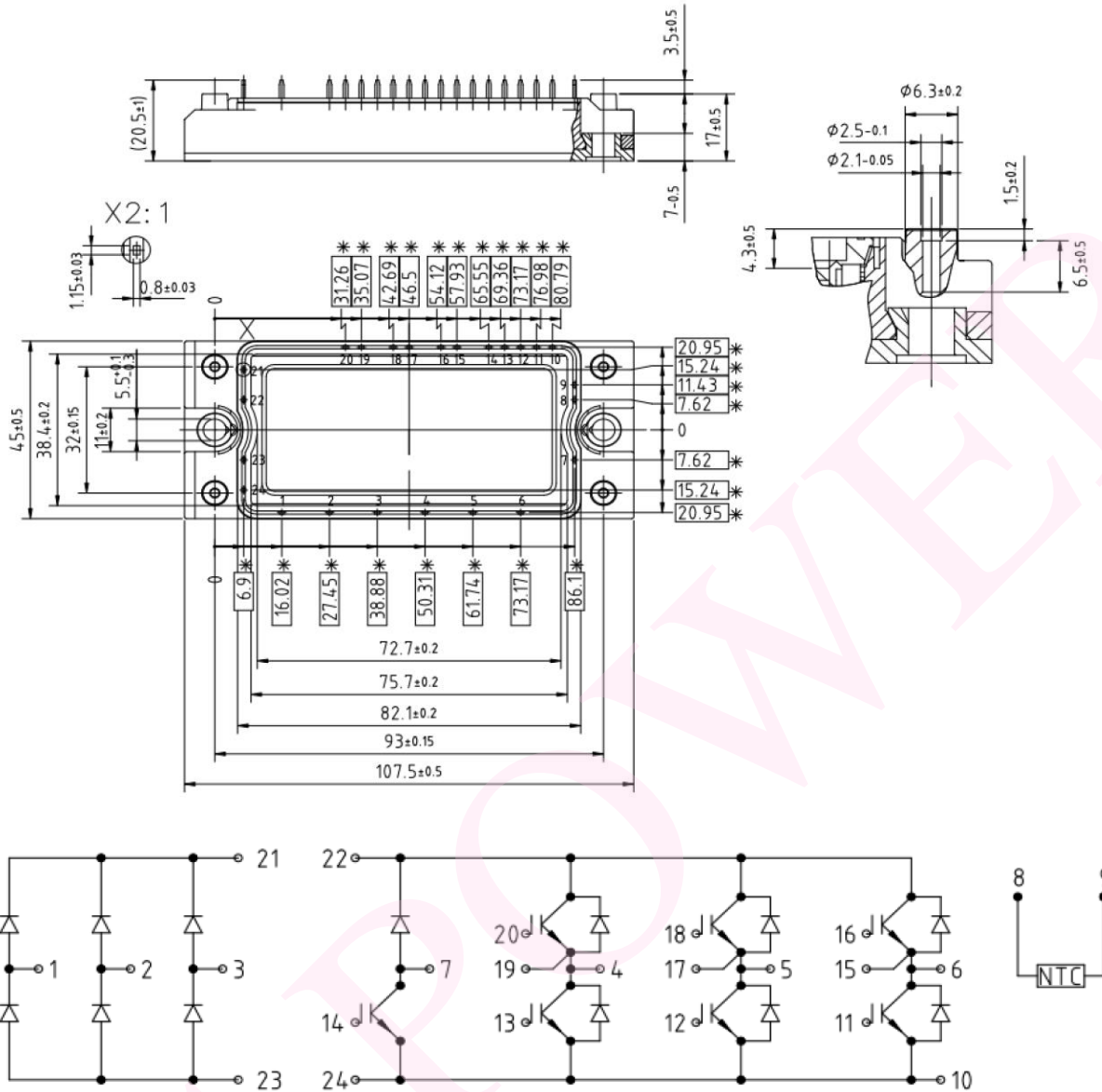


Fig. 9 NTC Temperature Characteristics

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Outline :



MS Power GmbH

Mergenthalerallee 79-81
 65760 Eschborn, Germany
 Web: www.mspowergroup.com
 Mail: info@mspowergroup.de

Sales & Enquiry:

sales@mspowergroup.de

Technical Support:

solution@mspowergroup.de

After sales Service:

service@mspowergroup.de

Phone: +49 (0) 6196/7768 666

Fax: +49 (0) 6196/7757 888



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