

Technische Information / technical information

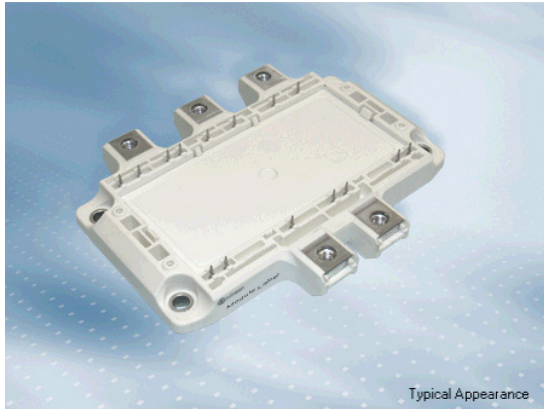
IGBT-Module
IGBT-modules

TDB6HK360N16P



EconoPACK™4 Modul und PressFIT / NTC
EconoPACK™4 module and PressFIT / NTC

Vorläufige Daten / preliminary data



$V_{CES} = 1600V$
 $I_{C\ nom} = 360A / I_{CRM} = 720A$

Typische Anwendungen

- Halbgesteuerte B6-Brücke
- Motorantriebe
- USV-Systeme

Typical Applications

- Half Controlled B6-bridge
- Motor Drives
- UPS Systems

Mechanische Eigenschaften

- 4 kV AC 1min Isolationsfestigkeit
- Integrierter NTC Temperatur Sensor
- Isolierte Bodenplatte
- PressFIT Verbindungstechnik

Mechanical Features

- 4 kV AC 1min Insulation
- Integrated NTC temperature sensor
- Isolated Base Plate
- PressFIT Contact Technology

Module Label Code

Barcode Code 128



DMX - Code



Content of the Code

Content of the Code	Digit
Module Serial Number	1 - 5
Module Material Number	6 - 11
Production Order Number	12 - 19
Datecode (Production Year)	20 - 21
Datecode (Production Week)	22 - 23

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Vorläufige Daten
preliminary data

Diode-Gleichrichter / diode-rectifier

Höchstzulässige Werte / maximum rated values

Periodische Rückw. Spitzensperrspannung repetitive peak reverse voltage	$T_{vj} = 25^{\circ}\text{C}$	V_{RRM}	1600	V
Durchlassstrom Grenzeffektivwert pro Dio. forward current RMS maximum per diode	$T_C = 80^{\circ}\text{C}$	I_{FRMSM}	210	A
Gleichrichter Ausgang Grenzeffektivstrom maximum RMS current at Rectifier output	$T_C = 80^{\circ}\text{C}$	I_{RMSM}	360	A
Stoßstrom Grenzwert surge forward current	$t_p = 10\text{ ms}, T_{vj} = 25^{\circ}\text{C}$ $t_p = 10\text{ ms}, T_{vj} = 150^{\circ}\text{C}$	I_{FSM}	2300 2100	A A
Grenzlastintegral I^2t - value	$t_p = 10\text{ ms}, T_{vj} = 25^{\circ}\text{C}$ $t_p = 10\text{ ms}, T_{vj} = 150^{\circ}\text{C}$	I^2t	26500 22000	A^2s A^2s

Charakteristische Werte / characteristic values

			min.	typ.	max.	
Durchlassspannung forward voltage	$T_{vj} = 150^{\circ}\text{C}, I_F = 210\text{ A}$	V_F		0,90		V
Sperrstrom reverse current	$T_{vj} = 150^{\circ}\text{C}, V_R = 1600\text{ V}$	I_R		1,40		mA
Innerer Wärmewiderstand thermal resistance, junction to case	pro Diode per diode	R_{thJC}			0,22	K/W
Übergangs-Wärmewiderstand thermal resistance, case to heatsink	pro Diode / per diode $\lambda_{paste} = 1\text{ W}/(\text{m}\cdot\text{K})$ / $\lambda_{grease} = 1\text{ W}/(\text{m}\cdot\text{K})$	R_{thCH}		0,069		K/W

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Vorläufige Daten
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Thyristor-Gleichrichter / thyristor-rectifier
Höchstzulässige Werte / maximum rated values

Periodische Rückw. Spitzensperrspannung repetitive peak reverse voltage	$T_{vj} = 25^{\circ}\text{C}$	V_{RRM}	1600	V
Durchlaßstrom Grenzeffektivwert pro Chip forward current RMS maximum per chip	$T_C = 80^{\circ}\text{C}$	I_{FRMSM}	210	A
Gleichrichter Ausgang Grenzeffektivstrom maximum RMS current at Rectifier output	$T_C = 80^{\circ}\text{C}$	I_{RMSmax}	360	A
Stoßstrom Grenzwert surge forward current	$t_p = 10\text{ms}, T_{vj} = 25^{\circ}\text{C}$ $t_p = 10\text{ms}, T_{vj} = 130^{\circ}\text{C}$	I_{FSM}	3000 2700	A
Grenzlastintegral I^2t - value	$t_p = 10\text{ms}, T_{vj} = 25^{\circ}\text{C}$ $t_p = 10\text{ms}, T_{vj} = 130^{\circ}\text{C}$	I^2t	45000 36500	A^2s
kritische Stromsteilheit critical rate of rise of on-state current	DIN IEC 60 754-6 $f = 50\text{Hz}, i_{GM} = 0,6\text{A}, di_G/dt = 0,6\text{A}/\mu\text{s}$	$(di/dt)_{cr}$	100	$\text{A}/\mu\text{s}$
kritische Spannungssteilheit critical rate of rise of on-state voltage	$T_{vj} = 130^{\circ}\text{C}, v_D = 0,67 V_{DRM}$	$(dv/dt)_{cr}$	1000	$\text{V}/\mu\text{s}$

Charakteristische Werte / characteristic values

			min.	typ.	max.	
Durchlaßspannung forward voltage	$T_{vj} = 130^{\circ}\text{C}, I_F = 210 \text{ A}$	V_F		1,05		V
Zündstrom gate trigger current	$T_{vj} = 25^{\circ}\text{C}, v_D = 12 \text{ V}$	I_{GT}			100	mA
Zündspannung gate trigger voltage	$T_{vj} = 25^{\circ}\text{C}, v_D = 12 \text{ V}$	V_{GT}			2,0	V
Nicht zündender Steuerstrom gate non-trigger current	$T_{vj} = 130^{\circ}\text{C}, v_D = 12 \text{ V}$ $T_{vj} = 130^{\circ}\text{C}, v_D = 0,5 V_{DRM}$	I_{GD}			6,0 3,0	mA
Nicht zündende Steuerspannung gate non-trigger voltage	$T_{vj} = 130^{\circ}\text{C}, v_D = 0,5 V_{DRM}$	V_{GD}			0,3	V
Haltestrom holding current	$T_{vj} = 25^{\circ}\text{C}, v_D = 12 \text{ V}, R_A = 5 \Omega$	I_H			220	mA
Einraststrom latching current	$T_{vj} = 25^{\circ}\text{C}, v_D = 12 \text{ V}, R_{GK} \geq 20 \Omega$ $i_{GM} = 0,6 \text{ A}, di_G/dt = 0,6 \text{ A}/\mu\text{s}, t_q = 20 \mu\text{s}$	I_L			550	mA
Zündverzug gate controlled delay time	DIN IEC 747-6 $T_{vj} = 25^{\circ}\text{C}, i_{GM} = 0,6 \text{ A}, di_G/dt = 0,6 \text{ A}/\mu\text{s}$	t_{gd}			1,2	μs
Freiwerdezeit circuit commutated turn-off time	$T_{vj} = 130^{\circ}\text{C}, i_{TM} = 50 \text{ A}$ $V_{RM} = 100 \text{ V}, V_{DM} = 0,67 V_{DRM}$ $dv_D/dt = 20 \text{ V}/\mu\text{s}, -di_T/dt = 10 \text{ A}/\mu\text{s}$	t_q		150		μs
Sperrstrom reverse current	$T_{vj} = 130^{\circ}\text{C}, V_R = 1600 \text{ V}$	I_{R_D}	-	10,0		mA
Innerer Wärmewiderstand thermal resistance, junction to case	pro Thyristor per thyristor	R_{thJC}			0,14	K/W
Übergangs-Wärmewiderstand thermal resistance, case to heatsink	pro Thyristor / per thyristor $\lambda_{Paste} = 1 \text{ W}/(\text{m}\cdot\text{K}) / \lambda_{grease} = 1 \text{ W}/(\text{m}\cdot\text{K})$	R_{thCH}		0,044		K/W

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Vorläufige Daten
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NTC-Widerstand / NTC-thermistor

Charakteristische Werte / characteristic values

			min.	typ.	max.	
Nennwiderstand rated resistance	$T_C = 25^\circ\text{C}$	R_{25}		5,00		k Ω
Abweichung von R_{100} deviation of R_{100}	$T_C = 100^\circ\text{C}$, $R_{100} = 493 \Omega$	$\Delta R/R$	-5		5	%
Verlustleistung power dissipation	$T_C = 25^\circ\text{C}$	P_{25}			20,0	mW
B-Wert B-value	$R_2 = R_{25} \exp [B_{25/50}(1/T_2 - 1/(298,15 \text{ K}))]$	$B_{25/50}$		3375		K
B-Wert B-value	$R_2 = R_{25} \exp [B_{25/80}(1/T_2 - 1/(298,15 \text{ K}))]$	$B_{25/80}$		3411		K
B-Wert B-value	$R_2 = R_{25} \exp [B_{25/100}(1/T_2 - 1/(298,15 \text{ K}))]$	$B_{25/100}$		3433		K

Angaben gemäß gültiger Application Note.
Specification according to the valid application note.

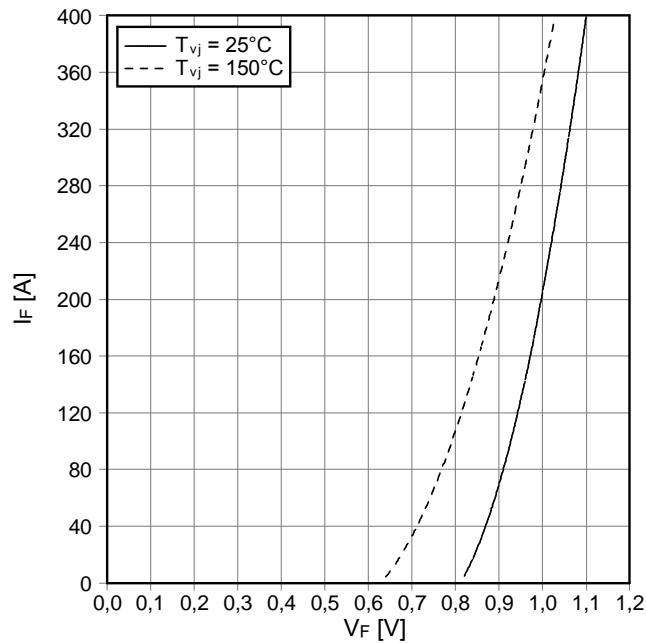
Modul / module

Isolations-Prüfspannung insulation test voltage	RMS, $f = 50 \text{ Hz}$, $t = 1 \text{ min.}$	V_{ISOL}		4,0		kV
Material Modulgrundplatte material of module baseplate				Cu		
Material für innere Isolation material for internal insulation				Al_2O_3		
Kriechstrecke creepage distance	Kontakt - Kühlkörper / terminal to heatsink Kontakt - Kontakt / terminal to terminal			25,0 12,5		mm
Luftstrecke clearance distance	Kontakt - Kühlkörper / terminal to heatsink Kontakt - Kontakt / terminal to terminal			11,0 7,0		mm
Vergleichszahl der Kriechwegbildung comparative tracking index		CTI		> 200		
			min.	typ.	max.	
Übergangs-Wärmewiderstand thermal resistance, case to heatsink	pro Modul / per module $\lambda_{\text{Paste}} = 1 \text{ W}/(\text{m}\cdot\text{K})$ / $\lambda_{\text{grease}} = 1 \text{ W}/(\text{m}\cdot\text{K})$	R_{thCH}		0,009		K/W
Modulinduktivität stray inductance module		L_{sCE}		20		nH
Modulleitungswiderstand, Anschlüsse - Chip module lead resistance, terminals - chip	$T_C = 25^\circ\text{C}$, pro Schalter / per switch	$R_{\text{CC}'+\text{EE}'}$		1,40		m Ω
Höchstzulässige Sperrschichttemperatur maximum junction temperature	Wechselrichter, Brems-Chopper / Inverter, Brake-Chopper Gleichrichter / rectifier	$T_{\text{vj max}}$			130 130	$^\circ\text{C}$ $^\circ\text{C}$
Temperatur im Schaltbetrieb temperature under switching conditions	Wechselrichter, Brems-Chopper / Inverter, Brake-Chopper Gleichrichter / rectifier	$T_{\text{vj op}}$	-40 -40		130 130	$^\circ\text{C}$ $^\circ\text{C}$
Lagertemperatur storage temperature		T_{stg}	-40		125	$^\circ\text{C}$
Anzugsdrehmoment f. mech. Befestigung mounting torque	Schraube M5 - Montage gem. gültiger Applikation Note screw M5 - mounting according to valid application note	M	3,00	-	6,00	Nm
Anzugsdrehmoment f. elektr. Anschlüsse terminal connection torque	Schraube - Montage gem. gültiger Applikation Note screw - mounting according to valid application note	M		-	6,0	Nm
Gewicht weight		G		350		g

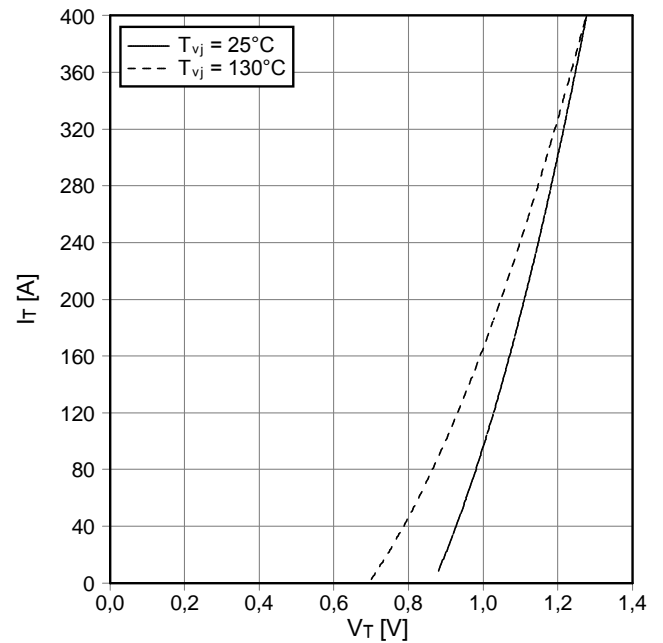
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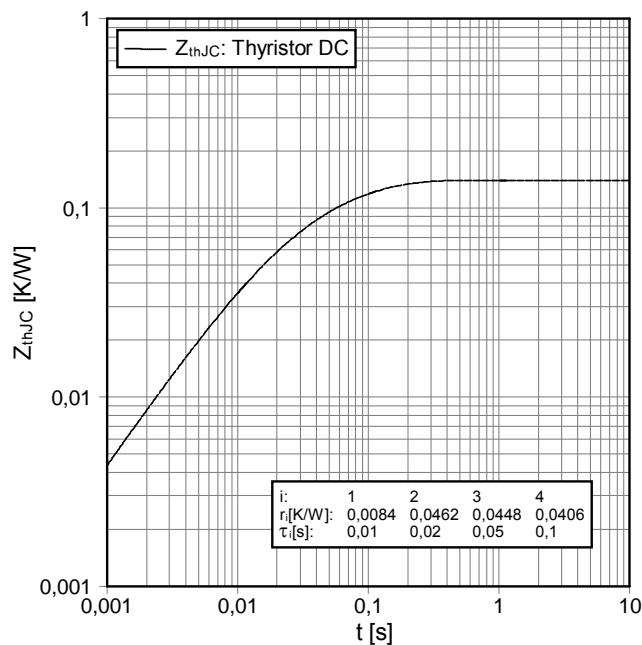
Durchlasskennlinie der Diode-Gleichrichter (typisch)
forward characteristic of diode-rectifier (typical)
 $I_F = f(V_F)$



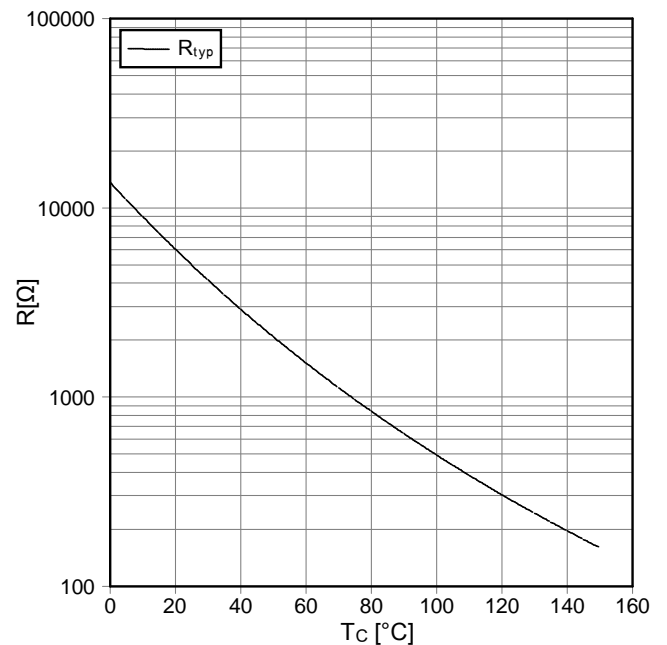
Durchlasskennlinie des Thyristors-Gleichrichter (typisch)
forward characteristic of thyristor-rectifier (typical)
 $I_T = f(V_T)$



Transienter Wärmewiderstand Thyristor-Gleichrichter
transient thermal impedance thyristor-rectifier
 $Z_{thJC} = f(t)$

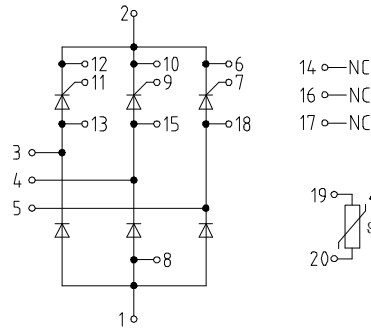


NTC-Temperaturkennlinie (typisch)
NTC-temperature characteristic (typical)
 $R = f(T)$

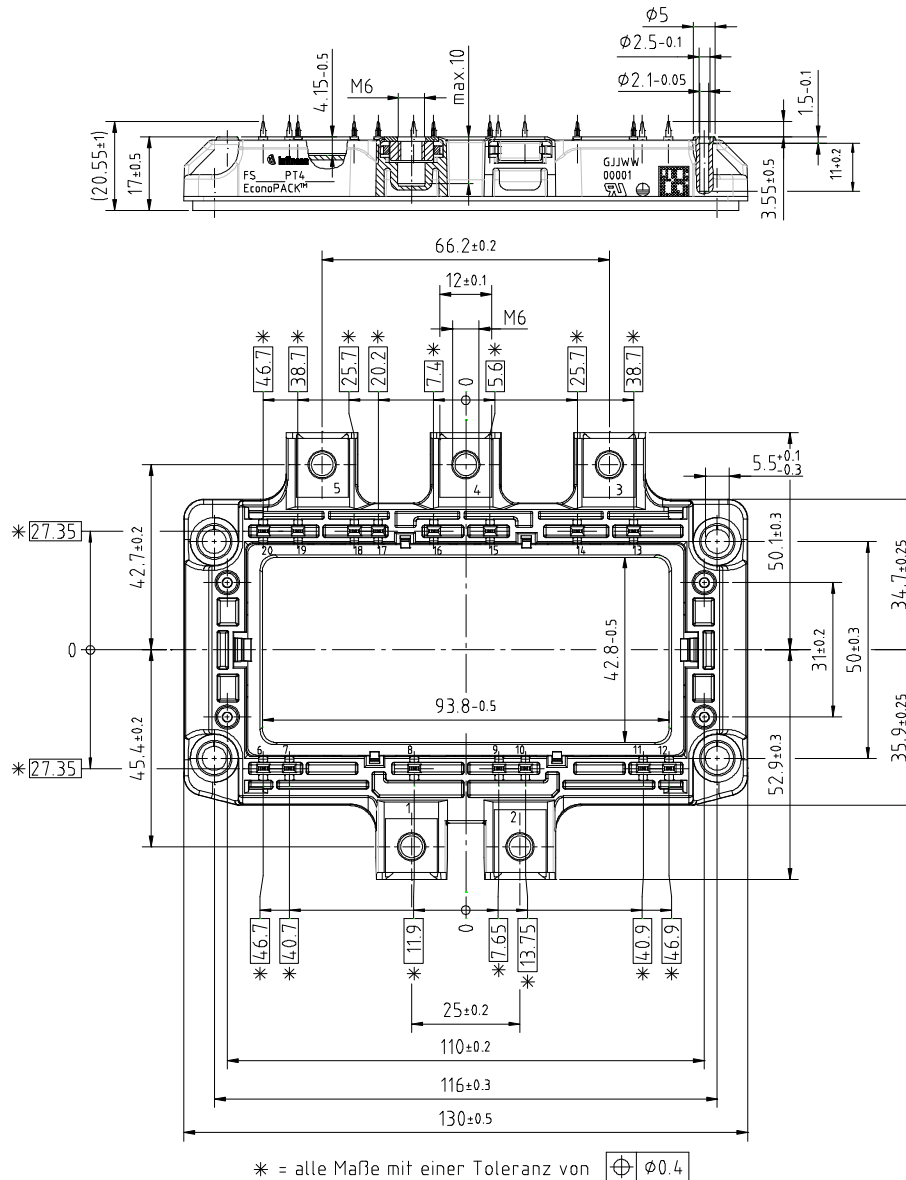


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Schaltplan / circuit diagram



Gehäuseabmessungen / package outlines



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