Chipsmall Limited consists of a professional team with an average of over 10 year of expertise in the distribution of electronic components. Based in Hongkong, we have already established firm and mutual-benefit business relationships with customers from,Europe,America and south Asia,supplying obsolete and hard-to-find components to meet their specific needs.

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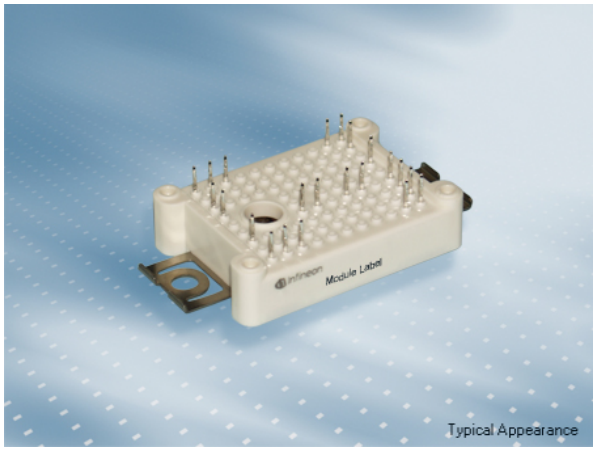
Tel: +86-755-8981 8866 Fax: +86-755-8427 6832
Email & Skype: info@chipsmall.com Web: www.chipsmall.com
Address: A1208, Overseas Decoration Building, #122 Zhenhua RD., Futian, Shenzhen, China

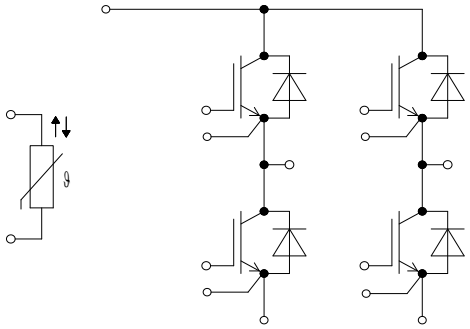
Technische Information / Technical Information

IGBT-Module
IGBT-modules

F4-75R07W1H3_B11A

EasyPACK Modul mit schnellem Trench/Feldstopp IGBT3 und Rapid 1 Diode und PressFIT / NTC
EasyPACK module with fast Trench/Fieldstop IGBT3 and Rapid 1 diode and PressFIT / NTC





V_{CES} = 650V
$I_{C\ nom}$ = 37,5A / I_{CRM} = 75A

Typische Anwendungen
- Anwendungen im Automobil
- Anwendungen mit hohen Schaltfrequenzen
- DC/DC Wandler
- Hilfsumrichter
- Hybrid-Elektrofahrzeuge (H)EV
- Induktives Erwärmen und Schweißen

Typical Applications
- Automotive Applications
- High Frequency Switching Application
- DC/DC converter
- Auxiliary Inverters
- Hybrid Electrical Vehicles (H)EV
- Inductive Heating and Welding

Elektrische Eigenschaften
- Erhöhte Sperrspannungsfestigkeit auf 650V
- High Speed IGBT H3
- Niederinduktives Design
- Niedrige Schaltverluste

Electrical Features
- Increased blocking voltage capability to 650V
- High Speed IGBT H3
- Low inductive design
- Low Switching Losses

Mechanische Eigenschaften
- 2,5 kV AC 1min Isolationsfestigkeit
- Große Luft- und Kriechstrecken
- Integrierter NTC Temperatur Sensor
- PressFIT Verbindungstechnik
- RoHS konform
- Robuste Montage durch integrierte Befestigungsklammern

Mechanical Features
- 2.5 kV AC 1min Insulation
- High Creepage and Clearance Distances
- Integrated NTC temperature sensor
- PressFIT Contact Technology
- RoHS compliant
- Rugged mounting due to integrated mounting clamps

Module Label Code

Barcode Code 128

Sample
00000123456000000000000

DMX - 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

prepared by: AS	date of publication: 2014-03-05	
approved by: TR	revision: 3.0	UL approved (E83335)

IGBT,Wechselrichter / IGBT,Inverter

Höchstzulässige Werte / Maximum Rated Values

Kollektor-Emitter-Sperrspannung Collector-emitter voltage	T_{vj} = 25°C	V_{CES}	650	V
Implementierter Kollektor-Strom Implemented collector current		I_{CN}	75	A
Kollektor-Dauergleichstrom Continuous DC collector current	T_C = 105°C, $T_{vj\,max}$ = 175°C	$I_{C\,nom}$	37,5	A
Periodischer Kollektor-Spitzenstrom Repetitive peak collector current	t_P = 1 ms	I_{CRM}	150	A
Gesamt-Verlustleistung Total power dissipation	T_C = 25°C, $T_{vj\,max}$ = 175°C	P_{tot}	275	W
Gate-Emitter-Spitzenspannung Gate-emitter peak voltage		V_{GES}	+/-20	V

Charakteristische Werte / Characteristic Values

			min.	typ.	max.	
Kollektor-Emitter-Sättigungsspannung Collector-emitter saturation voltage	I_C = 37,5 A, V_{GE} = 15 V I_C = 37,5 A, V_{GE} = 15 V I_C = 37,5 A, V_{GE} = 15 V	T_{vj} = 25°C T_{vj} = 125°C T_{vj} = 150°C	$V_{CE\,sat}$		1,50 1,55 1,60	1,85	V V V
Gate-Schwellenspannung Gate threshold voltage	I_C = 1,20 mA, V_{CE} = V_{GE}, T_{vj} = 25°C		V_{GEth}	4,9	5,8	6,5	V
Gateladung Gate charge	V_{GE} = -15 V ... +15 V		Q_G		0,80		µC
Interner Gatewiderstand Internal gate resistor	T_{vj} = 25°C		R_{Gint}		0,0		Ω
Eingangskapazität Input capacitance	f = 1 MHz, T_{vj} = 25°C, V_{CE} = 25 V, V_{GE} = 0 V		C_{ies}		4,70		nF
Rückwirkungskapazität Reverse transfer capacitance	f = 1 MHz, T_{vj} = 25°C, V_{CE} = 25 V, V_{GE} = 0 V		C_{res}		0,14		nF
Kollektor-Emitter-Reststrom Collector-emitter cut-off current	V_{CE} = 650 V, V_{GE} = 0 V, T_{vj} = 25°C		I_{CES}			0,05	mA
Gate-Emitter-Reststrom Gate-emitter leakage current	V_{CE} = 0 V, V_{GE} = 20 V, T_{vj} = 25°C		I_{GES}			400	nA
Einschaltverzögerungszeit, induktive Last Turn-on delay time, inductive load	I_C = 37,5 A, V_{CE} = 300 V V_{GE} = ±15 V R_{Gon} = 4,3 Ω	T_{vj} = 25°C T_{vj} = 125°C T_{vj} = 150°C	$t_{d\,on}$		0,019 0,019 0,02		µs µs µs
Anstiegszeit, induktive Last Rise time, inductive load	I_C = 37,5 A, V_{CE} = 300 V V_{GE} = ±15 V R_{Gon} = 4,3 Ω	T_{vj} = 25°C T_{vj} = 125°C T_{vj} = 150°C	t_r		0,011 0,012 0,012		µs µs µs
Abschaltverzögerungszeit, induktive Last Turn-off delay time, inductive load	I_C = 37,5 A, V_{CE} = 300 V V_{GE} = ±15 V R_{Goff} = 4,3 Ω	T_{vj} = 25°C T_{vj} = 125°C T_{vj} = 150°C	$t_{d\,off}$		0,16 0,19 0,20		µs µs µs
Fallzeit, induktive Last Fall time, inductive load	I_C = 37,5 A, V_{CE} = 300 V V_{GE} = ±15 V R_{Goff} = 4,3 Ω	T_{vj} = 25°C T_{vj} = 125°C T_{vj} = 150°C	t_f		0,006 0,012 0,013		µs µs µs
Einschaltverlustenergie pro Puls Turn-on energy loss per pulse	I_C = 37,5 A, V_{CE} = 300 V, L_S = 25 nH V_{GE} = ±15 V, di/dt = 3100 A/µs (T_{vj} = 150°C) R_{Gon} = 4,3 Ω	T_{vj} = 25°C T_{vj} = 125°C T_{vj} = 150°C	E_{on}		0,23 0,36 0,40		mJ mJ mJ
Abschaltverlustenergie pro Puls Turn-off energy loss per pulse	I_C = 37,5 A, V_{CE} = 300 V, L_S = 25 nH V_{GE} = ±15 V, du/dt = 5000 V/µs (T_{vj} = 150°C) R_{Goff} = 4,3 Ω	T_{vj} = 25°C T_{vj} = 125°C T_{vj} = 150°C	E_{off}		0,33 0,51 0,58		mJ mJ mJ
Kurzschlußverhalten SC data	V_{GE} ≤ 15 V, V_{CC} = 360 V V_{CEmax} = V_{CES} -L_{sCE} ·di/dt	t_P ≤ 4 µs, T_{vj} = 150°C	I_{SC}		430		A
Wärmewiderstand, Chip bis Gehäuse Thermal resistance, junction to case	pro IGBT / per IGBT		R_{thJC}		0,45	0,55	K/W

Wärmewiderstand, Gehäuse bis Kühlkörper Thermal resistance, case to heatsink	pro IGBT / per IGBT λ_{Paste} = 1 W/(m·K) / λ_{grease} = 1 W/(m·K)	R_{thCH}		0,65		K/W
Temperatur im Schaltbetrieb Temperature under switching conditions		$T_{vj\ op}$	-40		150	°C

Diode, Wechselrichter / Diode, Inverter

Höchstzulässige Werte / Maximum Rated Values

Periodische Spitzensperrspannung Repetitive peak reverse voltage	T_{vj} = 25°C	V_{RRM}		650		V
Dauergleichstrom Continuous DC forward current		I_F		25		A
Periodischer Spitzenstrom Repetitive peak forward current	t_P = 1 ms	I_{FRM}		50		A
Grenzlastintegral I²t - value	V_R = 0 V, t_P = 10 ms, T_{vj} = 125°C	I²t		50,0		A²s

Charakteristische Werte / Characteristic Values

			min.	typ.	max.	
Durchlassspannung Forward voltage	I_F = 25 A, V_{GE} = 0 V I_F = 25 A, V_{GE} = 0 V I_F = 25 A, V_{GE} = 0 V	T_{vj} = 25°C T_{vj} = 125°C T_{vj} = 150°C	V_F		1,65 1,60 1,55	2,15	V V V
Rückstromspitze Peak reverse recovery current	I_F = 25 A, - di_F/dt = 3000 A/µs (T_{vj}=150°C) V_R = 300 V V_{GE} = -15 V	T_{vj} = 25°C T_{vj} = 125°C T_{vj} = 150°C	I_{RM}		45,0 48,0 51,0		A A A
Sperrverzögerungsladung Recovered charge	I_F = 25 A, - di_F/dt = 3000 A/µs (T_{vj}=150°C) V_R = 300 V V_{GE} = -15 V	T_{vj} = 25°C T_{vj} = 125°C T_{vj} = 150°C	Q_r		1,05 1,65 1,90		µC µC µC
Abschaltenergie pro Puls Reverse recovery energy	I_F = 25 A, - di_F/dt = 3000 A/µs (T_{vj}=150°C) V_R = 300 V V_{GE} = -15 V	T_{vj} = 25°C T_{vj} = 125°C T_{vj} = 150°C	E_{rec}		0,25 0,39 0,44		mJ mJ mJ
Wärmewiderstand, Chip bis Gehäuse Thermal resistance, junction to case	pro Diode / per diode		R_{thJC}		1,25	1,45	K/W
Wärmewiderstand, Gehäuse bis Kühlkörper Thermal resistance, case to heatsink	pro Diode / per diode λ_{Paste} = 1 W/(m·K) / λ_{grease} = 1 W/(m·K)		R_{thCH}		0,95		K/W
Temperatur im Schaltbetrieb Temperature under switching conditions			$T_{vj\ op}$	-40		150	°C

NTC-Widerstand / NTC-Thermistor

Charakteristische Werte / Characteristic Values

			min.	typ.	max.	
Nennwiderstand Rated resistance	T_C = 25°C	R_{25}		5,00		kΩ
Abweichung von R100 Deviation of R100	T_C = 100°C, R_{100} = 493 Ω	ΔR/R	-5		5	%
Verlustleistung Power dissipation	T_C = 25°C	P_{25}			20,0	mW
B-Wert B-value	$R_2 = R_{25} \exp [B_{25/50}(1/T_2 - 1/(298,15\ K))]$	$B_{25/50}$		3375		K
B-Wert B-value	$R_2 = R_{25} \exp [B_{25/80}(1/T_2 - 1/(298,15\ K))]$	$B_{25/80}$		3411		K
B-Wert B-value	$R_2 = R_{25} \exp [B_{25/100}(1/T_2 - 1/(298,15\ K))]$	$B_{25/100}$		3433		K

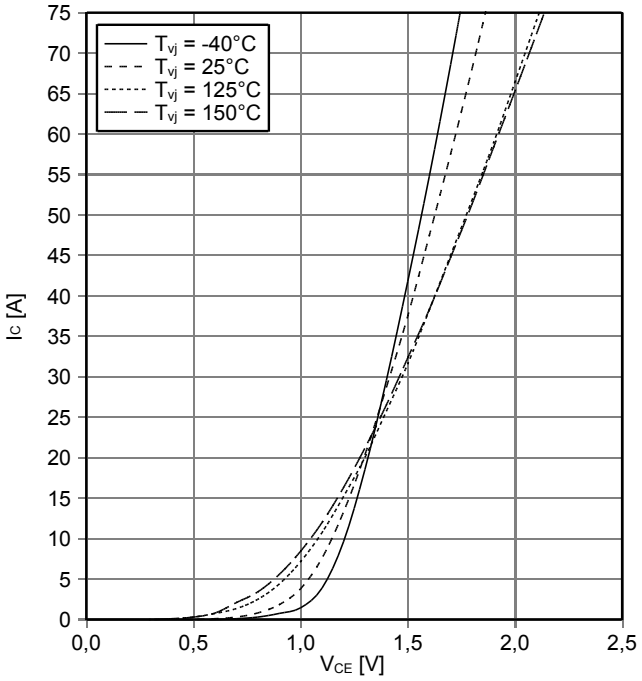
Angaben gemäß gültiger Application Note.
Specification according to the valid application note.

Modul / Module

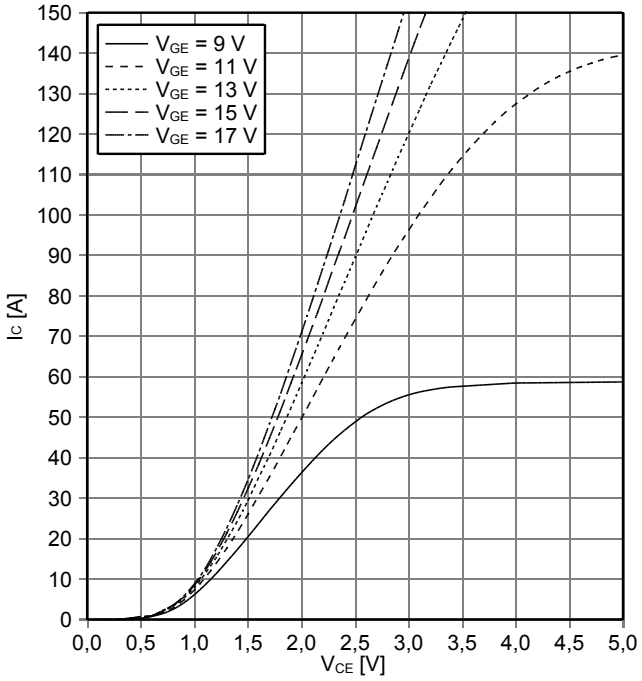
Isolations-Prüfspannung Isolation test voltage	RMS, f = 50 Hz, t = 1 min.	V_{ISOL}		2,5		kV
Innere Isolation Internal isolation	Basisisolierung (Schutzklasse 1, EN61140) basic insulation (class 1, IEC 61140)			impr.Al_2O_3		
Kriechstrecke Creepage distance	Kontakt - Kühlkörper / terminal to heatsink Kontakt - Kontakt / terminal to terminal			11,5 6,3		mm
Luftstrecke Clearance	Kontakt - Kühlkörper / terminal to heatsink Kontakt - Kontakt / terminal to terminal			10,0 5,0		mm
Vergleichszahl der Kriechwegbildung Comperative tracking index		CTI		> 200		
			min.	typ.	max.	
Modulstreuinduktivität Stray inductance module		L_{sCE}		15		nH
Modulleitungswiderstand, Anschlüsse - Chip Module lead resistance, terminals - chip	T_C = 25°C, pro Schalter / per switch	$R_{CC'+EE'}$		5,50		mΩ
Lagertemperatur Storage temperature		T_{stg}	-40		125	°C
Anpresskraft für mech. Bef. pro Feder mountig force per clamp		F	20	-	50	N
Gewicht Weight		G		24		g

Der Strom im Dauerbetrieb ist auf 25 A effektiv pro Anschlusspin begrenzt.
The current under continuous operation is limited to 25 A rms per connector pin.
VGE muss im Kurzschluss auf 15V begrenzt werden (z.B. Klemmschaltung).
VGE has to be limited to 15V during shortcircuit (e.g. clamping).

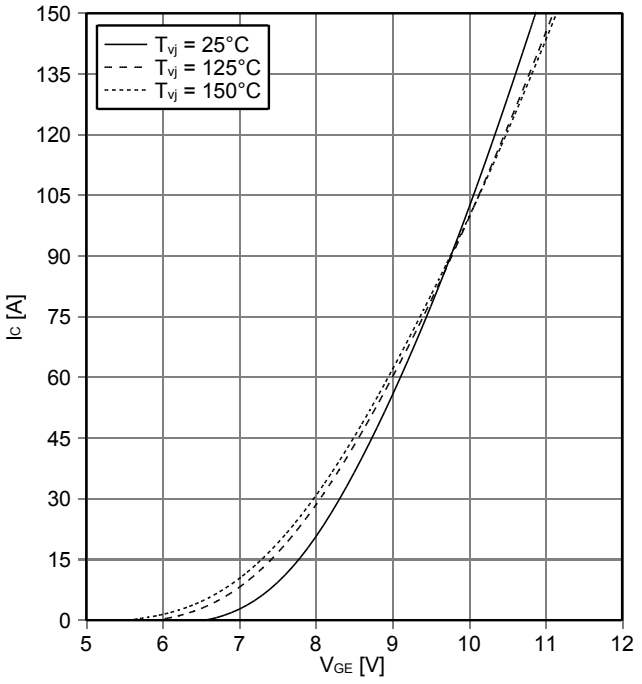
Ausgangskennlinie IGBT,Wechselrichter (typisch)
output characteristic IGBT,Inverter (typical)
$I_C = f(V_{CE})$
V_{GE} = 15 V



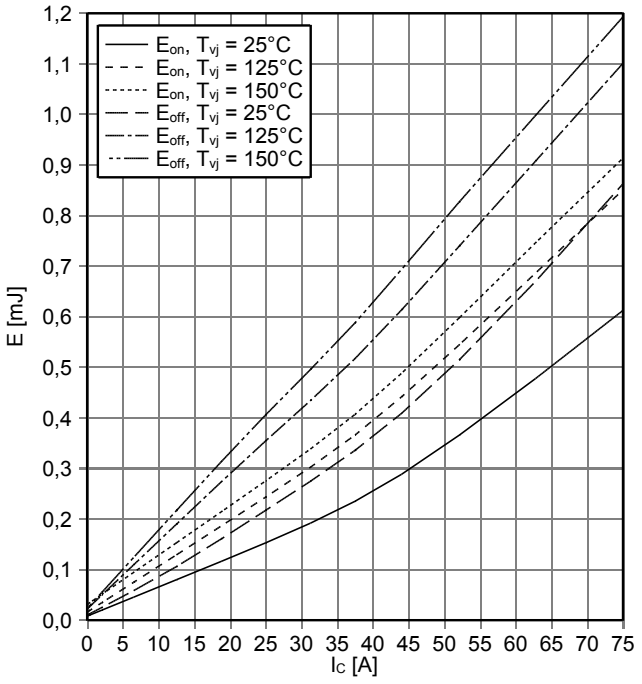
Ausgangskennlinienfeld IGBT,Wechselrichter (typisch)
output characteristic IGBT,Inverter (typical)
$I_C = f(V_{CE})$
T_{vj} = 150°C



Übertragungscharakteristik IGBT,Wechselrichter (typisch)
transfer characteristic IGBT,Inverter (typical)
$I_C = f(V_{GE})$
V_{CE} = 20 V



Schaltverluste IGBT,Wechselrichter (typisch)
switching losses IGBT,Inverter (typical)
$E_{on} = f(I_C)$, $E_{off} = f(I_C)$
V_{GE} = ±15 V, R_{Gon} = 4.3 Ω, R_{Goff} = 4.3 Ω, V_{CE} = 300 V



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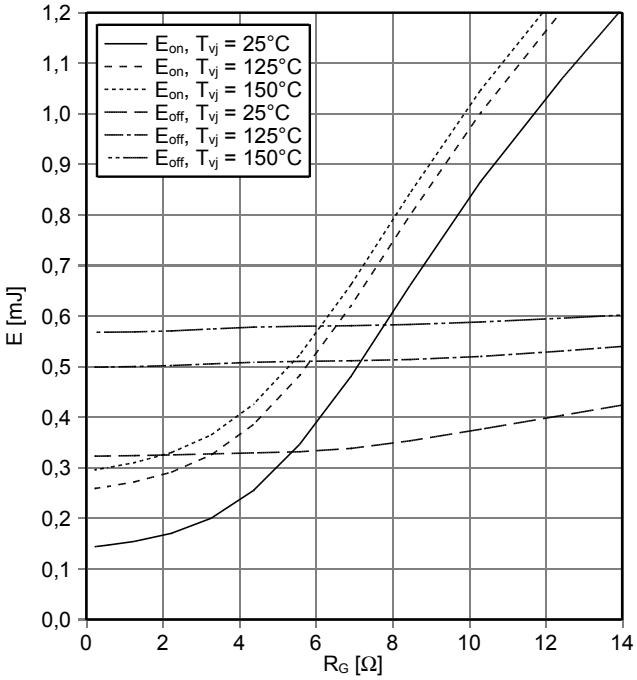
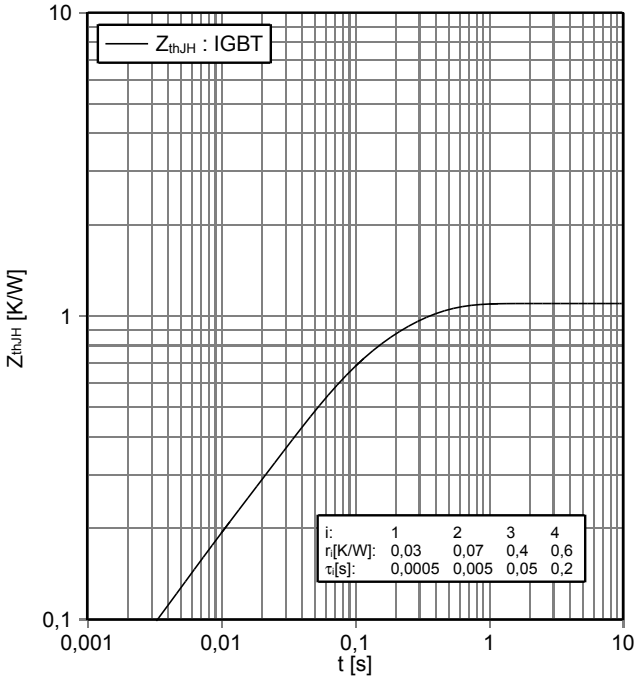
approved by: TR	revision: 3.0

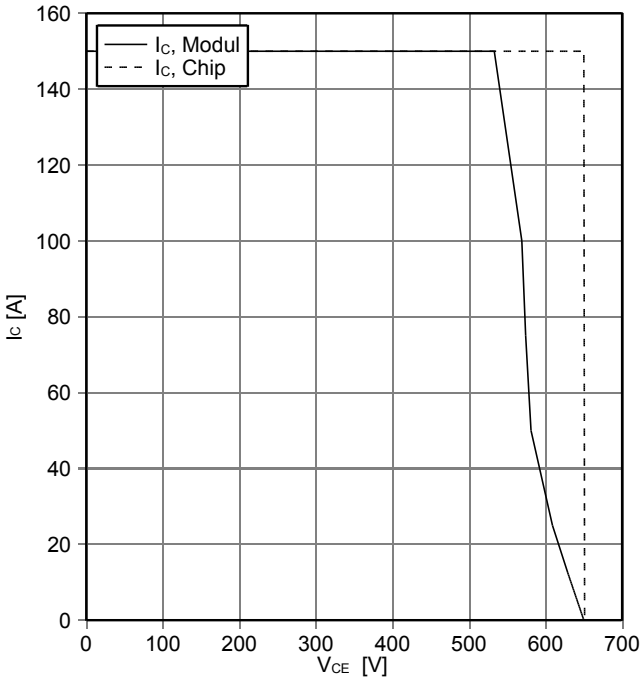
Schaltverluste IGBT,Wechselrichter (typisch)
switching losses IGBT,Inverter (typical)
$E_{on} = f(R_G)$, $E_{off} = f(R_G)$
V_{GE} = ±15 V, I_C = 37.5 A, V_{CE} = 300 V



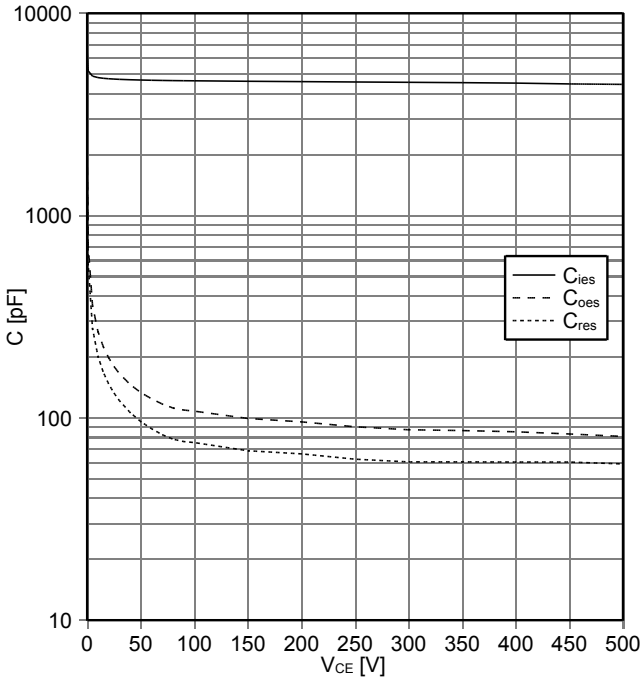
Transienter Wärmewiderstand IGBT,Wechselrichter
transient thermal impedance IGBT,Inverter
$Z_{thJH} = f(t)$



Sicherer Rückwärts-Arbeitsbereich IGBT,Wechselrichter (RBSOA)
reverse bias safe operating area IGBT,Inverter (RBSOA)
$I_C = f(V_{CE})$
V_{GE} = ±15 V, R_{Goff} = 4.3 Ω, T_{vj} = 150°C



Kapazitäts Charakteristik IGBT,Wechselrichter (typisch)
capacity charcteristic IGBT,Inverter (typical)
$C = f(V_{CE})$
V_{GE} = 0 V, T_{vj} = 25°C, f = 1MHz



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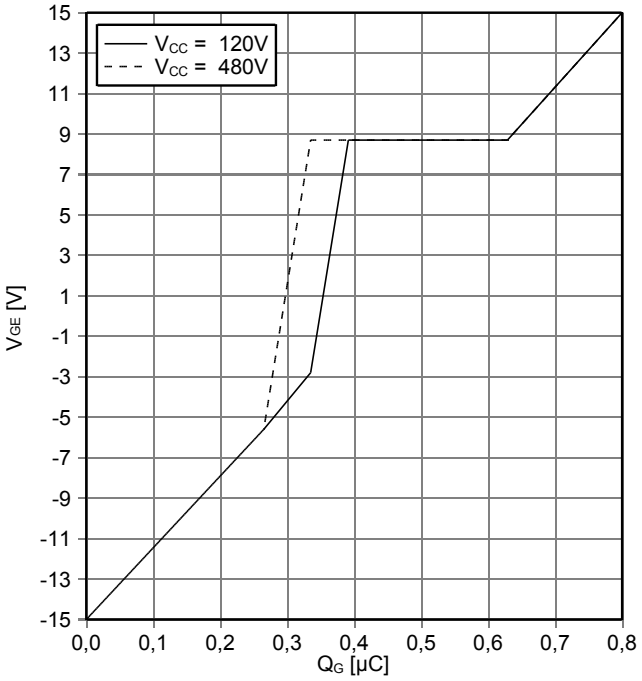
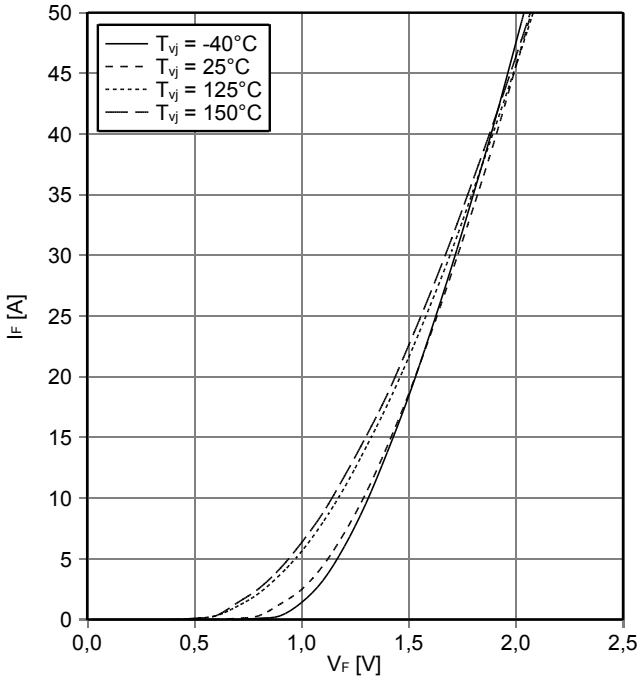
approved by: TR	revision: 3.0

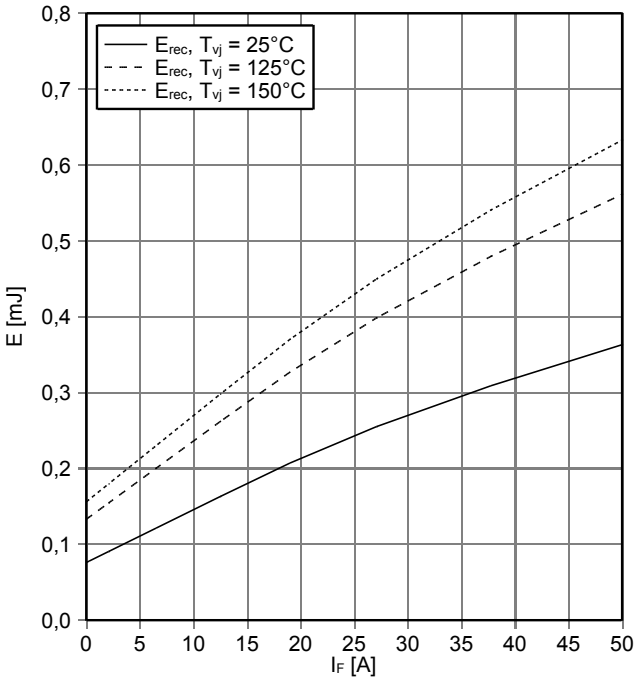
Gateladungs Charakteristik IGBT,Wechselrichter (typisch)
gate charge characteristic IGBT,Inverter (typical)
$V_{GE} = f(Q_G)$
$I_C = 37.5$ A, $T_{vj} = 25°C$



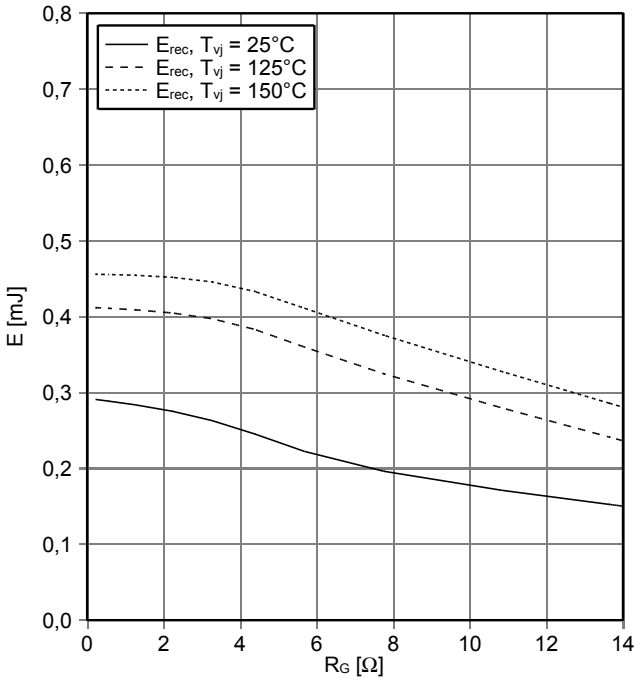
Durchlasskennlinie der Diode, Wechselrichter (typisch)
forward characteristic of Diode, Inverter (typical)
$I_F = f(V_F)$



Schaltverluste Diode, Wechselrichter (typisch)
switching losses Diode, Inverter (typical)
$E_{rec} = f(I_F)$
$R_{Gon} = 4.3\ \Omega$, $V_{CE} = 300$ V



Schaltverluste Diode, Wechselrichter (typisch)
switching losses Diode, Inverter (typical)
$E_{rec} = f(R_G)$
$I_F = 25$ A, $V_{CE} = 300$ V



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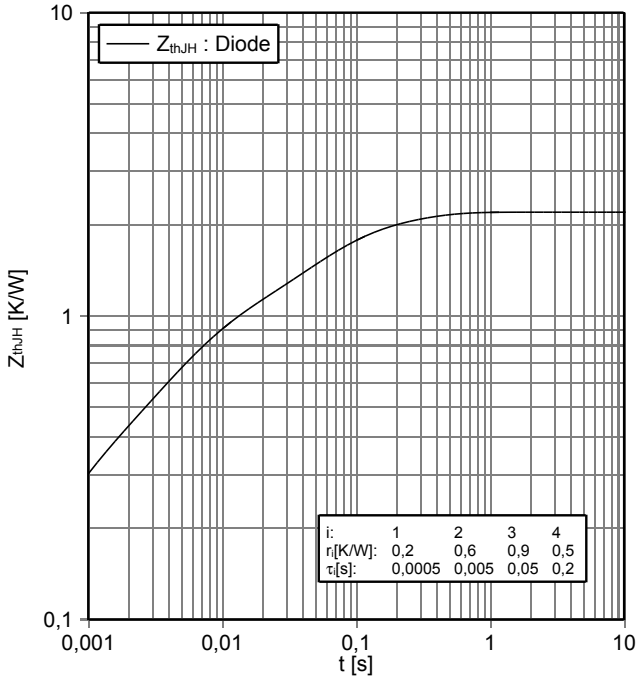
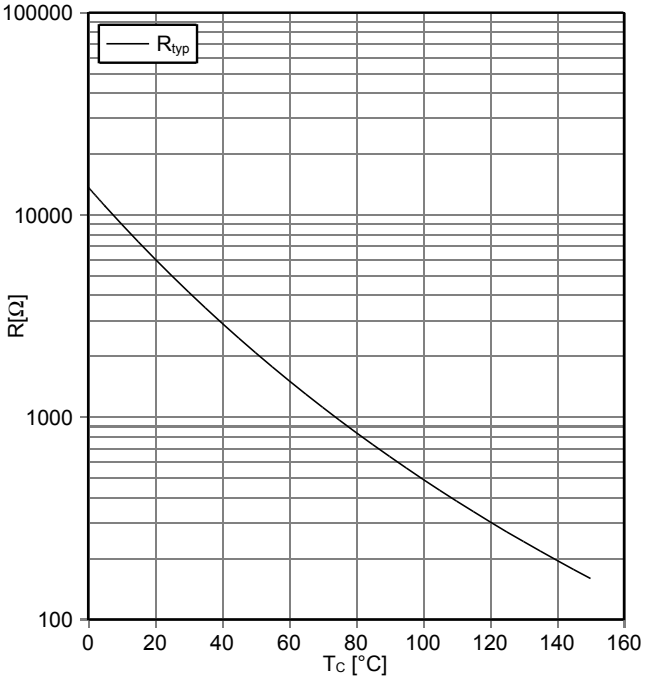
Transienter Wärmewiderstand Diode, Wechselrichter
transient thermal impedance Diode, Inverter
$Z_{thJH} = f(t)$



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



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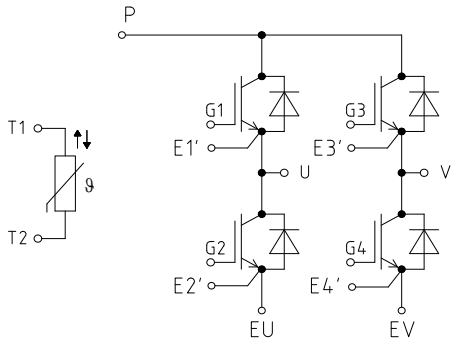
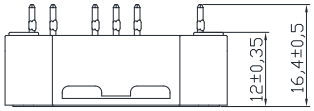
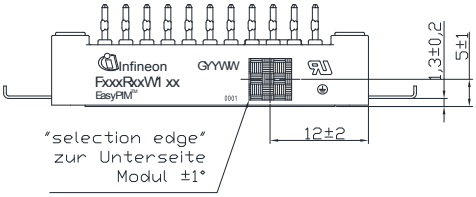
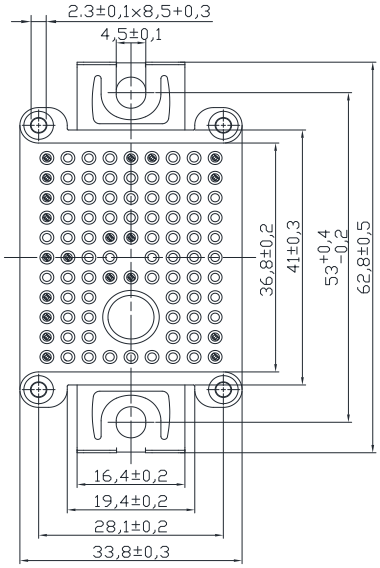
Schaltplan / circuit_diagram_headline

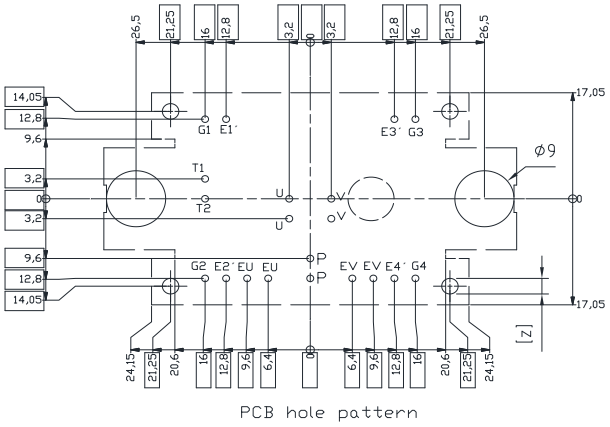


Gehäuseabmessungen / package outlines









PCB hole pattern

-Pin-Grid 3,2mm
-Tolerance of PCB hole pattern ⌖ 0,1 24x
-Hole specifiaction for contacts see application note EASY PressFIT
-Diameters of drill Ø1,15mm
and copper thickness in hole 25-50 µm
-[z] recommanded diameter of PCB positioning guiding holes Ø2,8mm

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