

flow PIM[®] 1 (2nd gen.), 600V
Maximum Ratings / Höchstzulässige Werte

Parameter	Condition	Symbol	Value	Unit
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Input Rectifier Bridge
Gleichrichter

Repetitive peak reverse voltage Periodische Rückw. Spitzensperrspannung		V_{RRM}	1600	
Forward current per diode Dauergrenzstrom	DC current $T_h=80^\circ\text{C};$ $T_c=80^\circ\text{C}$	I_{FAV}	33 40-limited by wires	A
Surge forward current Stoßstrom Grenzwert	$t_p=10\text{ms}$ $T_j=25^\circ\text{C}$	I_{FSM}	250	A
I^2t -value Grenzlastintegral	$t_p=10\text{ms}$ $T_j=25^\circ\text{C}$	I^2t	310	A ² s
Power dissipation per Diode Verlustleistung pro Diode	$T_j=150^\circ\text{C}$ $T_h=80^\circ\text{C}$ $T_c=80^\circ\text{C}$	P_{tot}	39 60,4	W

Transistor Inverter
Transistor Wechselrichter

Collector-emitter break down voltage Kollektor-Emitter-Sperrspannung		V_{CE}	600	V
DC collector current Kollektor-Dauergleichstrom	$T_j=150^\circ\text{C}$ $T_h=80^\circ\text{C},$ $T_c=80^\circ\text{C}$	I_C	20 30	A
Repetitive peak collector current Periodischer Kollektorspitzenstrom	$t_p=1\text{ms}$ $T_h=80^\circ\text{C}$	I_{cpuls}	40	A
Power dissipation per IGBT Verlustleistung pro IGBT	$T_j=150^\circ\text{C}$ $T_h=80^\circ\text{C}$ $T_c=80^\circ\text{C}$	P_{tot}	45 85	W
Gate-emitter peak voltage Gate-Emitter-Spitzenspannung		V_{GE}	± 20	V
SC withstand time Kurzschlußverhalten	$T_j \leq 150^\circ\text{C}$ $V_{CE}=600/1200\text{ V}$	t_{SC}		us

Diode Inverter
Diode Wechselrichter

DC forward current Dauergleichstrom	$T_j=150^\circ\text{C}$ $T_h=80^\circ\text{C},$ $T_c=80^\circ\text{C}$	I_F	25 30-limited by wires	A
Repetitive peak forward current Periodischer Spitzenstrom	$t_p=1\text{ms}$ $T_h=80^\circ\text{C}$	I_{FRM}	50	A
Power dissipation per Diode Verlustleistung pro Diode	$T_j=150^\circ\text{C}$ $T_h=80^\circ\text{C}$ $T_c=80^\circ\text{C}$	P_{tot}	30 60,0	W

Maximum Ratings / Höchstzulässige Werte

Parameter	Condition	Symbol	Value	Unit
Transistor Brake				
Transistor Bremse				
Collector-emitter break down voltage Kollektor-Emitter-Sperrspannung		V_{CE}	600	V
DC collector current Kollektor-Dauergleichstrom	$T_j=150^{\circ}\text{C}$ $T_h=80^{\circ}\text{C}$, $T_c=80^{\circ}\text{C}$	I_C	16 20-limited by wires	A
Repetitive peak collector current Periodischer Kollektorspitzenstrom	$t_p=1\text{ms}$ $T_h=80^{\circ}\text{C}$	I_{cpuls}	33	A
Power dissipation per IGBT Verlustleistung pro IGBT	$T_j=150^{\circ}\text{C}$ $T_h=80^{\circ}\text{C}$, $T_c=80^{\circ}\text{C}$	P_{tot}	39 59	W
Gate-emitter peak voltage Gate-Emitter-Spitzenspannung		V_{GE}	± 20	V
SC withstand time Kurzschlußverhalten	$T_j \leq 150^{\circ}\text{C}$ $V_{GE}=15\text{V}$ $V_{CE}=600/1200\text{ V}$	t_{SC}		us

Diode Brake
Diode Brake

DC forward current Dauergleichstrom	$T_j=150^{\circ}\text{C}$ $T_h=80^{\circ}\text{C}$, $T_c=80^{\circ}\text{C}$	I_F	7 10	A
Repetitive peak forward current Periodischer Spitzenstrom	$t_p=1\text{ms}$ $T_h=80^{\circ}\text{C}$	I_{FRM}	14	A
Power dissipation per Diode Verlustleistung pro Diode	$T_j=150^{\circ}\text{C}$ $T_h=80^{\circ}\text{C}$, $T_c=80^{\circ}\text{C}$	P_{tot}	13 20	W

Thermal properties
Thermische Eigenschaften

max. Chip temperature max. Chiptemperatur		T_{jmax}	150	$^{\circ}\text{C}$
Storage temperature Lagertemperatur		T_{stg}	-40...+125	$^{\circ}\text{C}$
Operation temperature Betriebstemperatur		T_{op}	-40...+125	$^{\circ}\text{C}$

Insulation properties
Modulisation

Insulation voltage Isolationsspannung	$t=1\text{min}$	V_{is}	4000	Vdc
Creepage distance Kriechstrecke			min 12,7	mm
Clearance Luftstrecke			min 12,7	mm

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Characteristic values

Description			Symbol				Datasheet values			Unit
T(C°)			Other conditions	V _{GE} (V)	V _R (V) V _{CE} (V)	I _C (A) I _F (A)				
			(R _{gon} -R _{goff})	V _{GS} (V)	V _{DS} (V)	I _d (A)	Min	Typ	Max	
Input Rectifier Bridge										
Gleichrichter										
Forward voltage Durchlaßspannung	V _F	T _J =25°C T _J =125°C				30		1,18 1,15	1,35	V
Threshold voltage (for power loss calc. only) Schleusenspannung	V _{to}	T _J =25°C T _J =125°C				30		0,9 0,78		V
Slope resistance (for power loss calc. only) Ersatzwiderstand	r _t	T _J =25°C T _J =125°C				30		0,009 0,012		Ohm
Reverse current Sperrstrom	I _r	T _J =25°C T _J =150°C			1200				0,02 4	mA
Thermal resistance chip to heatsink per chip Wärmewiderstand Chip-Kühlkörper pro Chip	R _{thJH}		Thermal grease thickness≤50um					1,8		K/W
Thermal resistance chip to case per chip Wärmewiderstand Chip-Gehäuse pro Chip	R _{thJC}		Wärmeleitpaste Dicke≤50um λ = 0,61 W/mK					1,2		K/W
Transistor Inverter										
Transistor Wechselrichter										
Gate emitter threshold voltage Gate-Schwellenspannung	V _{GE(th)}	T _J =25°C T _J =125°C	V _{CE} =V _{GE}			0,0007	3	4	5	V
Collector-emitter saturation voltage Kollektor-Emitter Sättigungsspannung	V _{CE(sat)}	T _J =25°C T _J =125°C		15		30	1,6	2	2,7	V
Collector-emitter cut-off current incl. Diode Kollektor-Emitter Reststrom	I _{CES}	T _J =25°C T _J =125°C		0	600				0,25	mA
Gate-emitter leakage current Gate-Emitter Reststrom	I _{GES}	T _J =25°C T _J =125°C		30	0				180	nA
Turn-on delay time Einschaltverzögerungszeit	t _{d(on)}	T _J =25°C T _J =150°C	R _{gon} =11Ohm R _{gof} =11Ohm	15	400	30		tbd		ns
Rise time Anstiegszeit	t _r	T _J =25°C T _J =150°C	R _{gon} =11Ohm R _{gof} =11Ohm	15	400	30		tbd		ns
Turn-off delay time Abschaltverzögerungszeit	t _{d(off)}	T _J =25°C T _J =150°C	R _{gon} =11Ohm R _{gof} =11Ohm	15	400	30		tbd		ns
Fall time Fallzeit	t _f	T _J =25°C T _J =150°C	R _{gon} =11Ohm R _{gof} =11Ohm	15	400	30		tbd		ns
Turn-on energy loss per pulse Einschaltverlustenergie pro Puls	E _{on}	T _J =25°C T _J =125°C						tbd		mWs
Turn-off energy loss per pulse Abschaltverlustenergie pro Puls	E _{off}	T _J =25°C T _J =125°C						tbd		mWs
Input capacitance Eingangskapazität	C _{iss}	T _J =25°C T _J =125°C	f=1MHz	0	25			1600		pF
Output capacitance Ausgangskapazität	C _{oss}	T _J =25°C T _J =125°C	f=1MHz	0	25			150		pF
Reverse transfer capacitance Rückwirkungskapazität	C _{rss}	T _J =25°C T _J =125°C	f=1MHz	0	25			92		pF
Gate charge Gate Ladung	Q _{Gate}	T _J =25°C T _J =125°C								nC
Thermal resistance chip to heatsink per chip Wärmewiderstand Chip-Kühlkörper pro Chip	R _{thJH}		Thermal grease thickness≤50um					1,5		K/W
Thermal resistance chip to case per chip Wärmewiderstand Chip-Gehäuse pro Chip	R _{thJC}		Wärmeleitpaste Dicke≤50um λ = 0,61 W/mK					0,8		K/W
Coupled thermal resistance inverter diode-transistor Gekoppelte Wärmewiderstand Wechselrichter Diode-Transistor	R _{thJH}		Thermal grease thickness≤50um Wärmeleitpaste Dicke≤50um λ = 0,61 W/mK							K/W

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Characteristic values

Description	Symbol	T(C°)	Other conditions (Rgon-Rgoff)	V _{GE} (V) V _{GS} (V)	V _R (V) V _{CE} (V) V _{DS} (V)	I _C (A) I _F (A) I _d (A)	Datasheet values			Unit
							Min	Typ	Max	

Diode Inverter

Diode Wechselrichter

Diode forward voltage Durchlaßspannung	V _F	T _J =25°C T _J =125°C				30		1,3 1,15	1,75	V
Peak reverse recovery current Rückstromspitze	I _{RRM}	T _J =25°C T _J =125°C	Rgon=40Ohm	15	300	30		tbd		A
Reverse recovery time Sperreverzögerungszeit	t _{rr}	T _J =25°C T _J =125°C	Rgon=40Ohm	15	300	30		tbd		ns
Reverse recovered charge Sperrverzögerungsladung	Q _{rr}	T _J =25°C T _J =125°C	Rgon=40Ohm	15	300	30		tbd		uC
Reverse recovered energy Sperrverzögerungsenergie	E _{rec}	T _J =25°C T _J =125°C	Rgon=40Ohm	15	300	30		tbd		mWs
Thermal resistance chip to heatsink per chip Wärmewiderstand Chip-Kühlkörper pro Chip	R _{thJH}		Thermal grease thickness≤50um Wärmeleitpaste Dicke≤50um λ = 0,61 W/mK					2,5		K/W
Thermal resistance chip to case per chip Wärmewiderstand Chip-Gehäuse pro Chip	R _{thJC}							1,5		K/W
Coupled thermal resistance inverter transistor-diode Gekoppelte Wärmewiderstand Wechselrichter Transistor-Diode	R _{thJH}		Thermal grease thickness≤50um Wärmeleitpaste Dicke≤50um λ = 0,61 W/mK					tbd		K/W

Transistor BRC

Transistor BRC

Gate emitter threshold voltage Gate-Schwellenspannung	V _{GE(th)}	T _J =25°C T _J =125°C	V _{CE} =V _{GE}			0,0005	3	4	5	V
Collector-emitter saturation voltage Kollektor-Emitter Sättigungsspannung	V _{CE(sat)}	T _J =25°C T _J =125°C		15		20	1,6	1,9	2,6	V
Collector-emitter cut-off Kollektor-Emitter Reststrom	I _{CES}	T _J =25°C T _J =125°C		0	600				0,07	mA
Gate-emitter leakage current Gate-Emitter Reststrom	I _{GES}	T _J =25°C T _J =125°C		30	0				180	nA
Turn-on delay time Einschaltverzögerungszeit	t _{d(on)}	T _J =25°C T _J =150°C	Rgon=16Ohm Rgoff=16Ohm	15	400	20		36	46	ns
Rise time Anstiegszeit	t _r	T _J =25°C T _J =150°C	Rgon=16Ohm Rgoff=16Ohm	15	400	20		30	36	ns
Turn-off delay time Abschaltverzögerungszeit	t _{d(off)}	T _J =25°C T _J =150°C	Rgon=16Ohm Rgoff=16Ohm	15	400	20		250	300	ns
Fall time Fallzeit	t _f	T _J =25°C T _J =150°C	Rgon=16Ohm Rgoff=16Ohm	15	400	20		63	76	ns
Turn-on energy loss per pulse Einschaltverlustenergie pro Puls	E _{on}	T _J =25°C T _J =125°C								uWs
Turn-off energy loss per pulse Abschaltverlustenergie pro Puls	E _{off}	T _J =25°C T _J =125°C								uWs
Input capacitance Eingangskapazität	C _{iss}	T _J =25°C T _J =125°C	f=1MHz	0	25			1100	1320	pF
Output capacitance Ausgangskapazität	C _{oss}	T _J =25°C T _J =125°C	f=1MHz	0	25			107	128	pF
Reverse transfer capacitance Rückwirkungskapazität	C _{rss}	T _J =25°C T _J =125°C	f=1MHz	0	25			63	75	pF
Gate charge Gate Ladung	Q _{Gate}									nC
Thermal resistance chip to heatsink per chip Wärmewiderstand Chip-Kühlkörper pro Chip	R _{thJH}	T _J =25°C						1,95		K/W
Thermal resistance chip to case per chip Wärmewiderstand Chip-Gehäuse pro Chip	R _{thJC}	T _J =125°C						1,3		K/W

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Description	Symbol									Datasheet values	Unit
	T(C°)	Other conditions (Rgon-Rgoff)	VGE(V) VGS(V)	V _R (V) V _{CE} (V) V _{DS} (V)	I _C (A) I _F (A) I _d (A)					Min Typ Max	

Diode BRC

Diode BRC

Diode forward voltage Durchlaßspannung	V _F	T _J =25°C T _J =150°C				6			1,27		V
Reverse current Sperrstrom	I _r	T _J =25°C T _J =125°C							TBD		uA
Peak reverse recovery current Rückstromspitze	I _{RRM}	T _J =25°C T _J =125°C	Rgon=68Ohm	15	300	5			TBD		A
Reverse recovery time Sperrverzögerungszeit	t _{rr}	T _J =25°C T _J =125°C	Rgon=68Ohm	15	300	5			TBD		ns
Reverse recovered charge Sperrverzögerungsladung	Q _{rr}	T _J =25°C T _J =125°C	Rgon=68Ohm	15	300	5			TBD		uC
Reverse recovery energy Sperrverzögerungsenergie	E _{rec}	T _J =25°C T _J =125°C	Rgon=68Ohm	15	300	5			TBD		uWs
Thermal resistance chip to heatsink per chip Wärmewiderstand Chip-Kühlkörper pro Chip	R _{thJH}		Thermal grease thickness≤50um						5,1		K/W
Thermal resistance chip to case per chip Wärmewiderstand Chip-Gehäuse pro Chip	R _{thJC}		Wärmeleitpaste Dicke≤50um λ = 0,61 W/mK						3,8		K/W

NTC-Thermistor

NTC-Widerstand

Rated resistance Nennwiderstand	R ₂₅	T _J =25°C	Tol. ±5%					20,9	22	23,1	kOhm
Deviation of R100 Abweichung von R100	D _{R/R}	T _C =100°C	R100=1503W						2,9		%/K
Power dissipation given Epcos-Typ Verlustleistung Epcos-Typ angeben	P	T _J =25°C							210		mW
B-value B-Wert	B _(25/100)	T _J =25°C	Tol. ±3%						3980		K