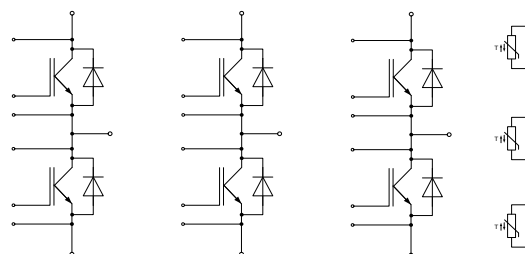
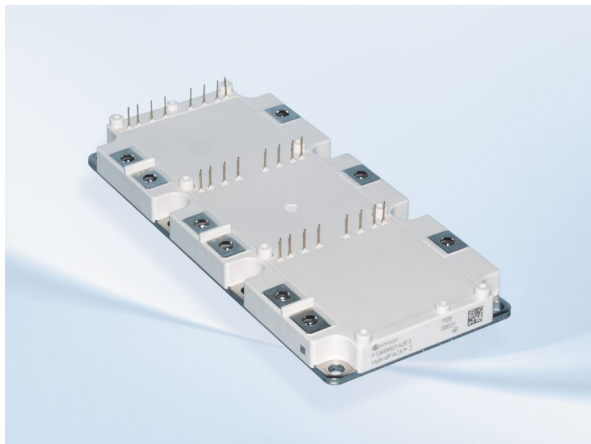


HybridPACK™2 Modul mit Trench/Feldstopp IGBT3 und Emitter Controlled 3 Diode und NTC
HybridPACK™2 module with Trench/Fieldstop IGBT3 and Emitter Controlled 3 diode and NTC



$V_{CES} = 650V$
 $I_{C\ nom} = 800A / I_{CRM} = 1600A$

Typische Anwendungen

- Anwendungen im Automobil
- Hybrid-Elektrofahrzeuge (H)EV
- Hybrid-Nutzfahrzeuge
- Motorantriebe

Typical Applications

- Automotive Applications
- Hybrid Electrical Vehicles (H)EV
- Commercial Agriculture Vehicles
- Motor Drives

Elektrische Eigenschaften

- Erhöhte Sperrspannungsfestigkeit auf 650V
- Hohe Stromdichte
- Niederinduktives Design
- Niedrige Schaltverluste
- $T_{vj\ op} = 150^{\circ}C$
- Trench IGBT 3
- V_{CESat} mit positivem Temperaturkoeffizienten

Electrical Features

- Increased blocking voltage capability to 650V
- High Current Density
- Low Inductive Design
- Low Switching Losses
- $T_{vj\ op} = 150^{\circ}C$
- Trench IGBT 3
- V_{CESat} with positive Temperature Coefficient

Mechanische Eigenschaften

- 2,5 kV AC 1min Isolationsfestigkeit
- Direkt gekühlte Bodenplatte
- Hohe Leistungsdichte
- Integrierter NTC Temperatur Sensor
- Isolierte Bodenplatte
- Kupferbodenplatte
- RoHS konform

Mechanical Features

- 2.5 kV AC 1min Insulation
- Direct Cooled Base Plate
- High Power Density
- Integrated NTC temperature sensor
- Isolated Base Plate
- Copper Base Plate
- RoHS compliant

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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IGBT, Wechselrichter / IGBT, Inverter

Höchstzulässige Werte / Maximum Rated Values

Kollektor-Emitter-Sperrspannung Collector-emitter voltage	$T_{vj} = 25^{\circ}\text{C}$	V_{CES}	650	V
Implementierter Kollektor-Strom Implemented collector current		I_{CN}	800	A
Kollektor-Dauergleichstrom Continuous DC collector current	$T_F = 75^{\circ}\text{C}, T_{vj\ max} = 175^{\circ}\text{C}$ $T_F = 25^{\circ}\text{C}, T_{vj\ max} = 175^{\circ}\text{C}$	$I_{C\ nom}$ I_C	550 700	A A
Periodischer Kollektor-Spitzenstrom Repetitive peak collector current	$t_P = 1\ \text{ms}$	I_{CRM}	1600	A
Gesamt-Verlustleistung Total power dissipation	$T_F = 25^{\circ}\text{C}, T_{vj\ max} = 175^{\circ}\text{C}$	P_{tot}	1500	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	$I_C = 550\ \text{A}, V_{GE} = 15\ \text{V}$ $I_C = 550\ \text{A}, V_{GE} = 15\ \text{V}$ $I_C = 550\ \text{A}, V_{GE} = 15\ \text{V}$	$T_{vj} = 25^{\circ}\text{C}$ $T_{vj} = 125^{\circ}\text{C}$ $T_{vj} = 150^{\circ}\text{C}$	$V_{CE\ sat}$	1,30 1,35 1,40	1,60	V V V
Gate-Schwellenspannung Gate threshold voltage	$I_C = 13,0\ \text{mA}, V_{CE} = V_{GE}, T_{vj} = 25^{\circ}\text{C}$		V_{Geth}	4,90	5,80	6,50 V
Gateladung Gate charge	$V_{GE} = -15\ \text{V} \dots +15\ \text{V}$		Q_G	8,60		μC
Interner Gatewiderstand Internal gate resistor	$T_{vj} = 25^{\circ}\text{C}$		R_{Gint}	0,5		Ω
Eingangskapazität Input capacitance	$f = 1\ \text{MHz}, T_{vj} = 25^{\circ}\text{C}, V_{CE} = 25\ \text{V}, V_{GE} = 0\ \text{V}$		C_{ies}	52,0		nF
Rückwirkungskapazität Reverse transfer capacitance	$f = 1\ \text{MHz}, T_{vj} = 25^{\circ}\text{C}, V_{CE} = 25\ \text{V}, V_{GE} = 0\ \text{V}$		C_{res}	1,50		nF
Kollektor-Emitter-Reststrom Collector-emitter cut-off current	$V_{CE} = 650\ \text{V}, V_{GE} = 0\ \text{V}, T_{vj} = 25^{\circ}\text{C}$		I_{CES}		5,0	mA
Gate-Emitter-Reststrom Gate-emitter leakage current	$V_{CE} = 0\ \text{V}, V_{GE} = 20\ \text{V}, T_{vj} = 25^{\circ}\text{C}$		I_{GES}		400	nA
Einschaltverzögerungszeit, induktive Last Turn-on delay time, inductive load	$I_C = 550\ \text{A}, V_{CE} = 300\ \text{V}$ $V_{GE} = \pm 15\ \text{V}$ $R_{Gon} = 1,8\ \Omega$	$T_{vj} = 25^{\circ}\text{C}$ $T_{vj} = 125^{\circ}\text{C}$ $T_{vj} = 150^{\circ}\text{C}$	t_{don}	0,12 0,12 0,13		μs μs μs
Anstiegszeit, induktive Last Rise time, inductive load	$I_C = 550\ \text{A}, V_{CE} = 300\ \text{V}$ $V_{GE} = \pm 15\ \text{V}$ $R_{Gon} = 1,8\ \Omega$	$T_{vj} = 25^{\circ}\text{C}$ $T_{vj} = 125^{\circ}\text{C}$ $T_{vj} = 150^{\circ}\text{C}$	t_r	0,10 0,10 0,10		μs μs μs
Abschaltverzögerungszeit, induktive Last Turn-off delay time, inductive load	$I_C = 550\ \text{A}, V_{CE} = 300\ \text{V}$ $V_{GE} = \pm 15\ \text{V}$ $R_{Goff} = 0,75\ \Omega$	$T_{vj} = 25^{\circ}\text{C}$ $T_{vj} = 125^{\circ}\text{C}$ $T_{vj} = 150^{\circ}\text{C}$	t_{doff}	0,51 0,53 0,55		μs μs μs
Fallzeit, induktive Last Fall time, inductive load	$I_C = 550\ \text{A}, V_{CE} = 300\ \text{V}$ $V_{GE} = \pm 15\ \text{V}$ $R_{Goff} = 0,75\ \Omega$	$T_{vj} = 25^{\circ}\text{C}$ $T_{vj} = 125^{\circ}\text{C}$ $T_{vj} = 150^{\circ}\text{C}$	t_f	0,04 0,06 0,07		μs μs μs
Einschaltverlustenergie pro Puls Turn-on energy loss per pulse	$I_C = 550\ \text{A}, V_{CE} = 300\ \text{V}, L_S = 20\ \text{nH}$ $V_{GE} = \pm 15\ \text{V}, di/dt = 5500\ \text{A}/\mu\text{s} (T_{vj} = 150^{\circ}\text{C})$ $R_{Gon} = 1,8\ \Omega$	$T_{vj} = 25^{\circ}\text{C}$ $T_{vj} = 125^{\circ}\text{C}$ $T_{vj} = 150^{\circ}\text{C}$	E_{on}	10,5 12,0 12,5		mJ mJ mJ
Abschaltverlustenergie pro Puls Turn-off energy loss per pulse	$I_C = 550\ \text{A}, V_{CE} = 300\ \text{V}, L_S = 20\ \text{nH}$ $V_{GE} = \pm 15\ \text{V}, du/dt = 2700\ \text{V}/\mu\text{s} (T_{vj} = 150^{\circ}\text{C})$ $R_{Goff} = 0,75\ \Omega$	$T_{vj} = 25^{\circ}\text{C}$ $T_{vj} = 125^{\circ}\text{C}$ $T_{vj} = 150^{\circ}\text{C}$	E_{off}	21,0 25,0 26,0		mJ mJ mJ
Kurzschlußverhalten SC data	$V_{GE} \leq 15\ \text{V}, V_{CC} = 360\ \text{V}$ $V_{CEmax} = V_{CES} - L_{SCE} \cdot di/dt$	$t_P \leq 8\ \mu\text{s}, T_{vj} = 25^{\circ}\text{C}$ $t_P \leq 6\ \mu\text{s}, T_{vj} = 150^{\circ}\text{C}$	I_{SC}	5600 4000		A A
Wärmewiderstand, Chip bis Kühl-Flüssigkeit Thermal resistance, junction to cooling fluid	pro IGBT / per IGBT cooling fluid = 50% water/50% ethylenglycol; $\Delta V/\Delta t = 10,0\ \text{dm}^3/\text{min}$		R_{thJF}		0,10	K/W
Temperatur im Schaltbetrieb Temperature under switching conditions			$T_{vj\ op}$	-40	150	$^{\circ}\text{C}$

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