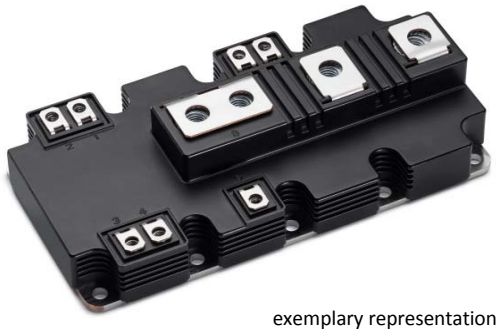
Technical Information for power module
DP 650B1700T104001

Q4.04.50.237 Rev. 02 Preliminary Data sheet

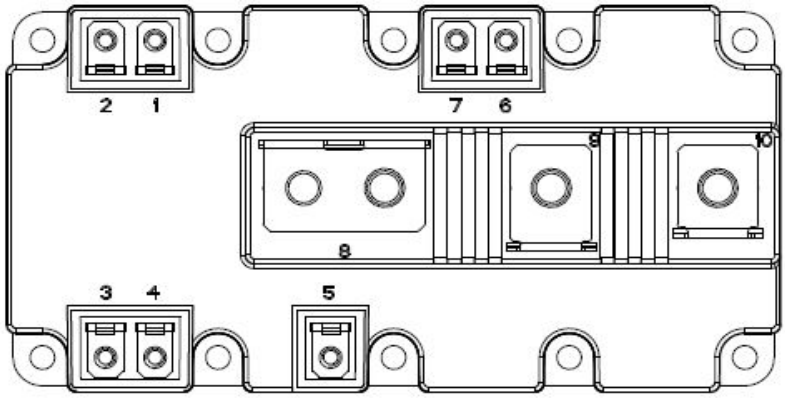
Author: HSM Dept.: DSP-RE Date: 03.09.2015

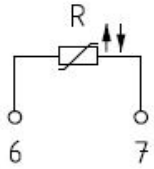


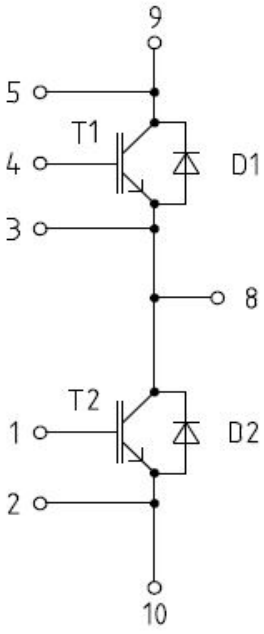
exemplary representation

Features

- **Low Stray Inductance**
- **High Power Density**
- **Trench Fieldstop IGBT´s**
- **Soft Switching Diodes**
- **Ready for ShowerPower®**







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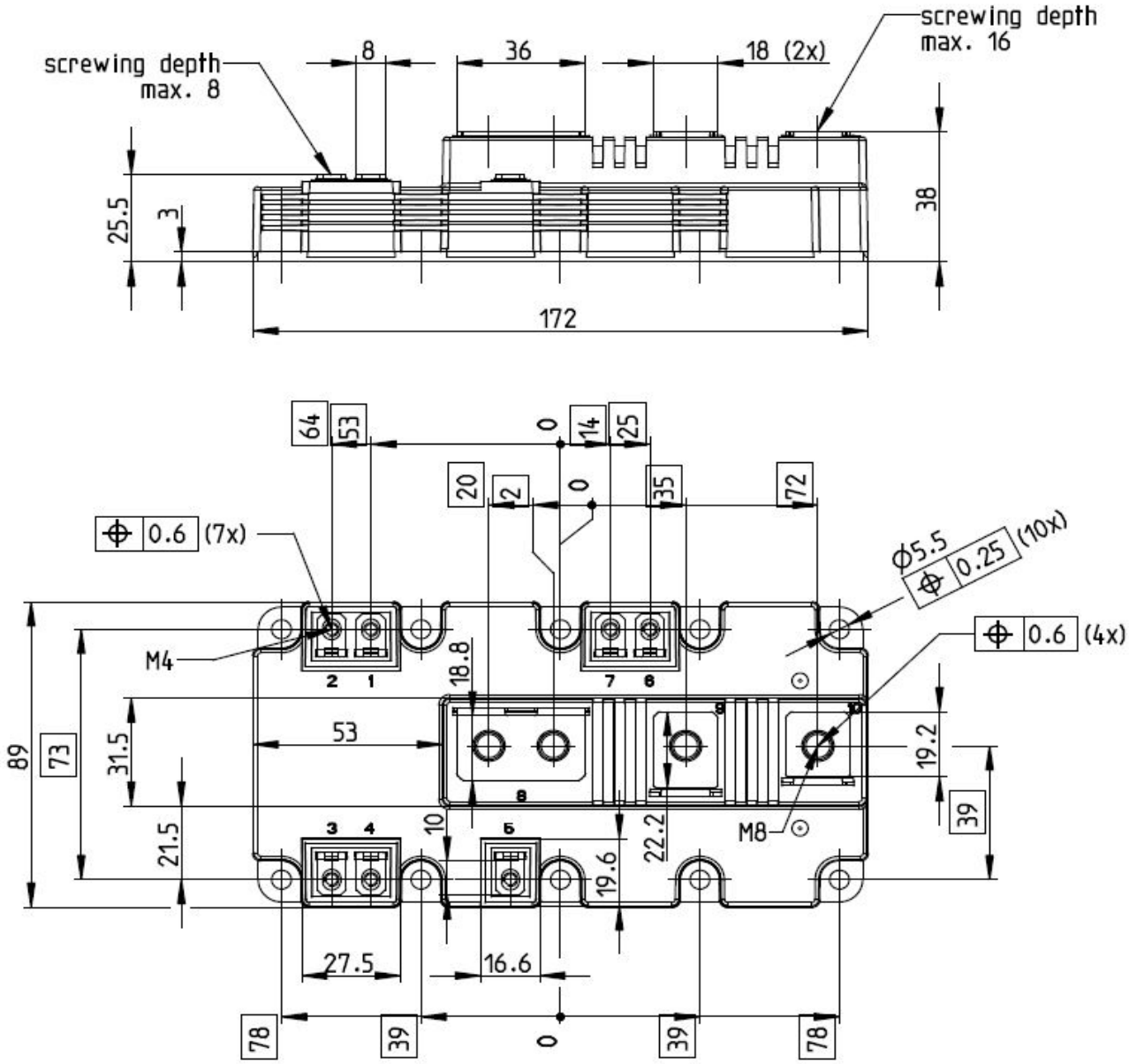

Marking: DP650B1700T104001

# = F (Production Location Flensburg)
XXXXXXXXX = Production Lot
JJWWL/ZZZZZ = Date- & Lotcode / Serial No.

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Absolute Maximum Ratings (@ T_j=25°C unless otherwise specified)					
Parameter	**Conditions**	**Tj**	**Symbol**	**value**	**Unit**
IGBT T1/T2					
collector-to-emitter voltage	V_{GE} ≤ 0 V		V_{CES}	1700	V
collector current	T_C = 95 °C	175°C	I_C	650	A
pulse collector current	pulse 1 ms		I_{CM}	1200	A
gate-to-emitter voltage			V_{GES}	±20	V
junction temperature product reliability results are valid for Tj=150°C			T_j	-40...+175	°C
operation temperature			$T_{j,op}$	-40...+150	°C
short-circuit characteristic	$V_{CE(max)} = V_{CES} - L_\sigma * \Delta i/\Delta t$ V_{CC} = 1000 V $V_{GE(on)}$ ≤ 15 V	150°C	t_{SC}	10	µs
DIODE D1/D2					
diode reverse voltage			V_R	1700	V
diode forward current	T_C = 50 °C	175°C	I_F	650	A
pulse diode forward current	pulse 1 ms		I_{FM}	1300	A
I^2t value	V_R = 0 V t_P = 10 ms	150°C	I^2t	67	kA^2s
junction temperature product reliability results are valid for Tj=150°C			T_j	175	°C
operation temperature			$T_{j,op}$	150	°C
NTC R					
power dissipation			P_{25}	20	mW
operation temperature			$T_{j,op}$	-50...+200	°C
Housing/Module (material of baseplate is Cu; material of insulation is Al2O3)					
current			$I_{t(RMS)}$	650	A
storage temperature			$T_{j,stg}$	-40...+150	°C
isolation testvoltage	AC voltage f = 50 Hz 1 minute		V_{isol}	4000	V
creepage distance	terminal to heatsink			40.2	mm
	terminal to terminal			33.1	mm
clearance distance	terminal to heatsink			24.2	mm
	terminal to terminal			19	mm
module stray inductance			$L_{\sigma ce}$	18	nH
module lead resistance	terminal to chips		R_{module}	0.4	mΩ

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Absolute Maximum Ratings for UL release

Parameter	Conditions	Symbol	value	Unit
storage temperature		$T_{j,stg}$	-40...+150	°C
junction temperature product reliability results are valid for Tj=150°C		T_j	150	°C
isolation testvoltage	AC voltage f = 50 Hz 1 minute	V_{isol}	4000	V

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Electrical characteristics (@ Tj=25°C unless otherwise specified)

Parameter	Conditions	Tj	Symbol	min.	typ.	max	Unit
IGBT T1/T2							
collector-to-emitter on-state voltage	I_C = 600 A		$V_{CE(sat)}$		1.9	2.25	V
chip level values	V_{GE} = 15 V	150°C			2.4		V
gate-emitter leakage current	V_{CE} = 0 V		I_{GES}			1200	nA
	V_{GE} = 20 V						
collector-emitter cut-off current	V_{CE} = 1700 V		I_{CES}			100	µA
	V_{GE} = 0 V						
gate-to-emitter threshold voltage	I_C = 24 mA		$V_{GE(th)}$	5.2	5.8	6.4	V
	V_{CE} = V_{GE}						
input capacitance	f = 1 MHz		C_{ies}		54		nF
output capacitance	V_{CE} = 25 V		C_{oes}				
reverse transfer capacitance	V_{GE} = 0 V		C_{res}		1.72		nF
total gate charge	V_{CE} = 900 V		Q_G		5600		nC
	V_{GE} = -10...+15 V						
internal gate resistance			R_G		1.75		Ω
turn-on delay time	V_{CE} = 900 V		$t_{d(on)}$		300		ns
	I_C = 650 A	150°C			325		ns
	L_S = 18 nH						
turn-on rise time	V_{GE} = 15 V		t_r		65		ns
	$R_{G(on)}$ = 0.56 Ω	150°C			75		ns
	Δi/Δt = 8481 A/µs						
turn-on switching energy per pulse	(T_{vj}=150°C)		E_{on}		115		mJ
		150°C			200		mJ
turn-off delay time	V_{CE} = 900 V		$t_{d(off)}$		625		ns
	I_C = 650 A	150°C			800		ns
	L_S = 18 nH						
turn-off fall time	V_{GE} = 15 V		t_f		110		ns
	$R_{G(off)}$ = 0.56 Ω	150°C			175		ns
	Δu/Δt = 3296 V/µs						
turn-off switching energy per pulse	(T_{vj}=150°C)		E_{off}		120		mJ
		150°C			225		mJ
thermal resistance	junction to case		$R_{th(JC)}$		0.037		K/W

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Electrical characteristics (@ Tj=25°C unless otherwise specified)

Parameter	Conditions	Tj	Symbol	min.	typ.	max	Unit
DIODE D1/D2							
forward voltage	I_F = 600 A		V_f		1.8	2.25	V
chip level values		150°C			1.9		V
reverse leakage current	V_R = 1700 V		I_R			108	µA
peak reverse recovery current	V_R = 900 V		I_{RM}		896		A
	I_F = 650 A	150°C			976		A
	$\Delta i/\Delta t$ = 8481 A/µs						
reverse recovery energy	(T_{vj}=150°C)		E_{rec}		100		mJ
		150°C			180		mJ
recovery charge			Q_{rr}		160		µC
		150°C			295		µC
thermal resistance	junction to case		$R_{th(JC)}$		0.06		K/W
NTC R							
zero power resistance			R_{25}	4.54	5	5.5	kΩ
		80°C	R_{80}	0.79	0.84	0.89	kΩ
		100°C	R_{100}	0.47	0.49	0.52	kΩ
B value			$B_{25/80}$		3414		K
			$B_{25/100}$		3436		K

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Mechanical characteristics (@ Tj=25°C unless otherwise specified)							
Parameter	**Conditions**	**Tj**	**Symbol**	**min.**	**typ.**	**max**	**Unit**
Housing/Module (material of baseplate is Cu; material of insulation is Al2O3)							
mounting torque	screws M5		M_{M5}	5.5		6.5	Nm
terminal connection torque	screws M4		M_{M4}	1.8		2.1	Nm
	screws M8		M_{M8}	8		10	Nm
weight			m		845		g
comparative tracking index			CTI	400			
thickness of baseplate					3		mm
thickness of insulation					0.38		mm

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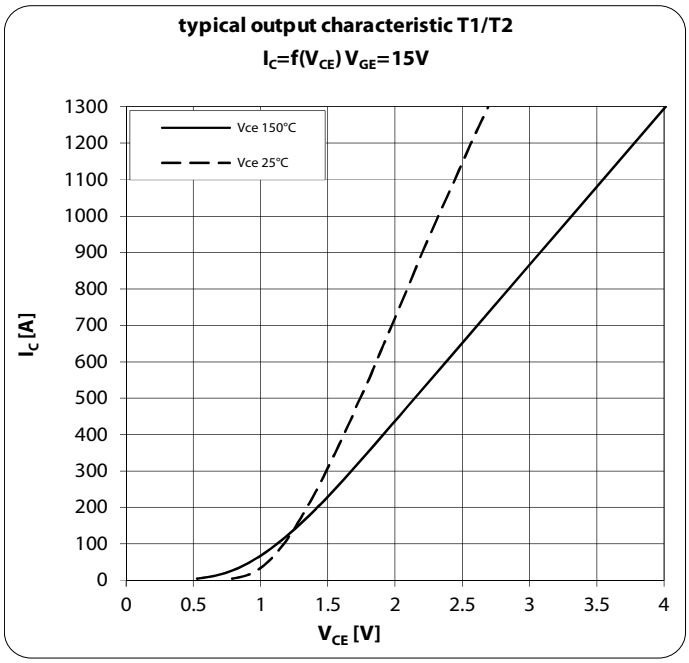
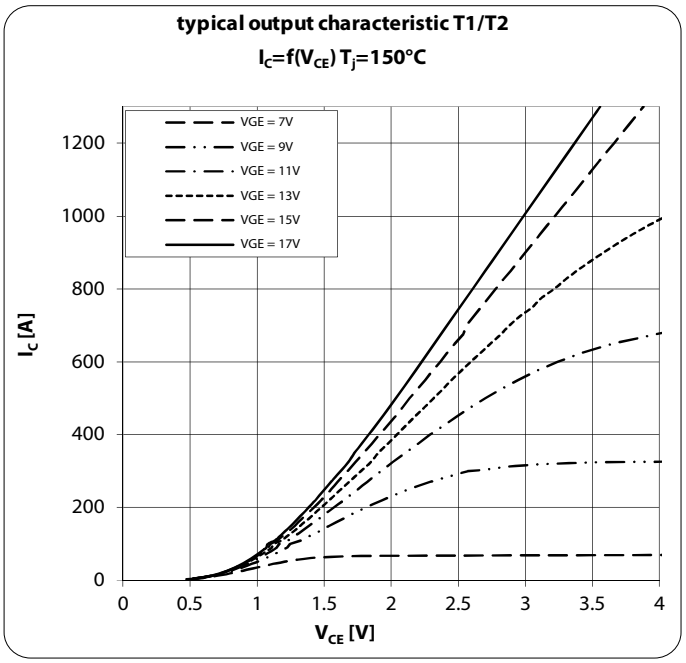
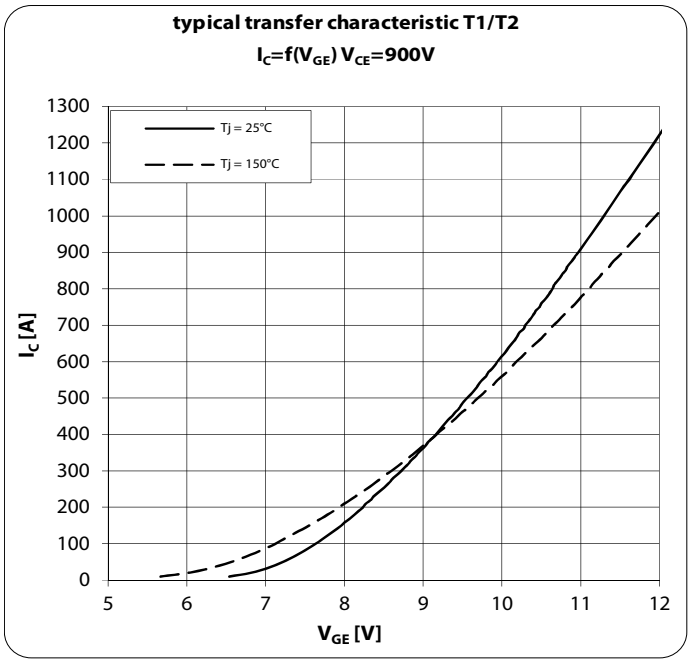
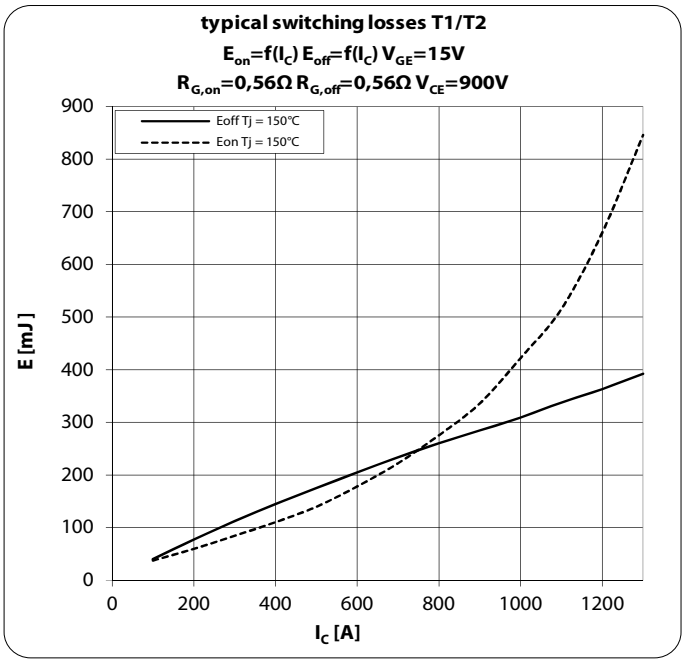
Characteristic curves









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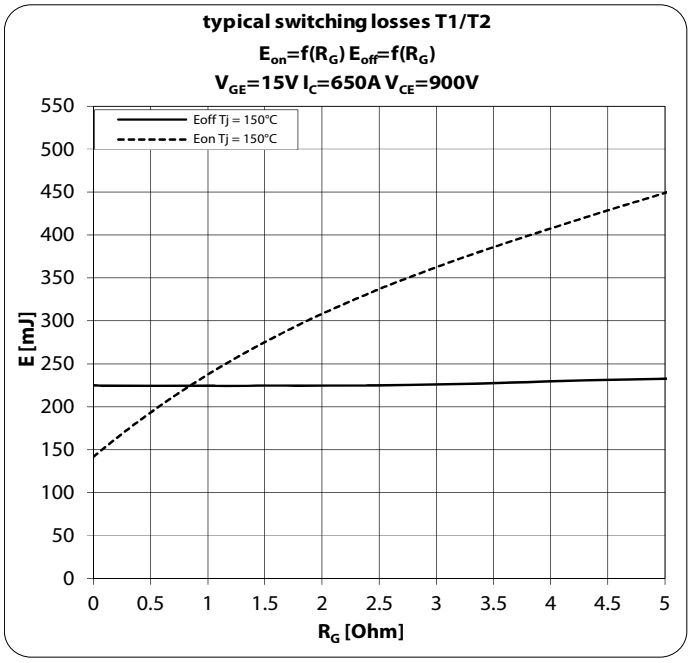

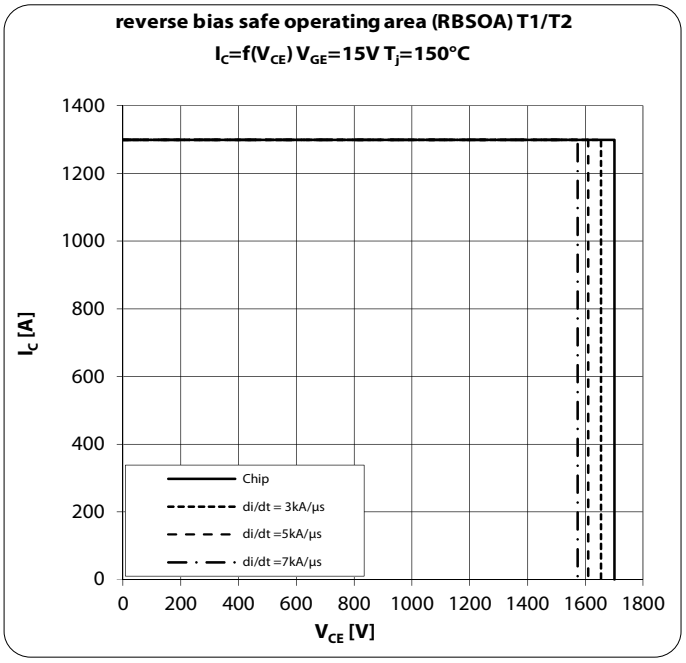

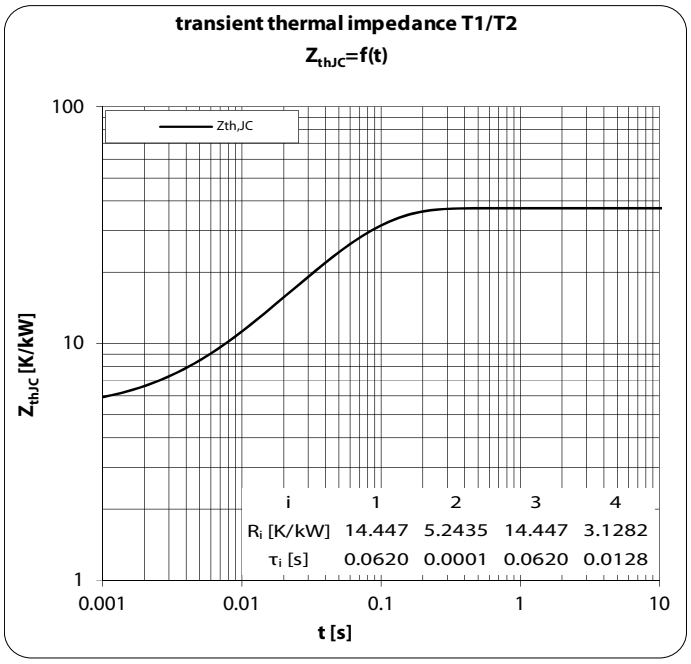

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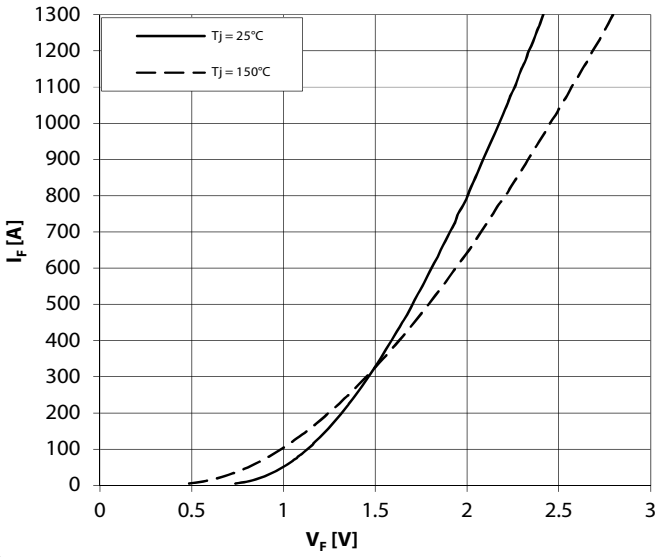
typical forward characteristic D1/D2

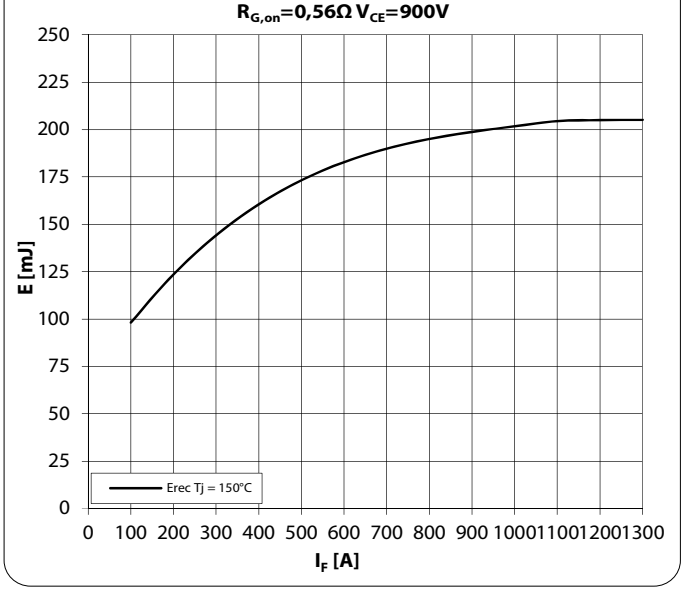
$I_F=f(V_F)$



typical switching losses D1/D2

$E_{rec}=f(I_F)$

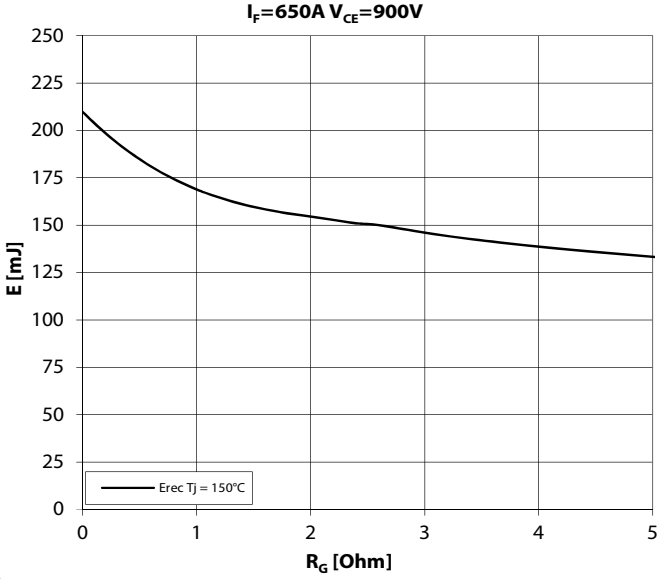
$R_{G,on}=0,56\Omega$ $V_{CE}=900V$



typical switching losses D1/D2

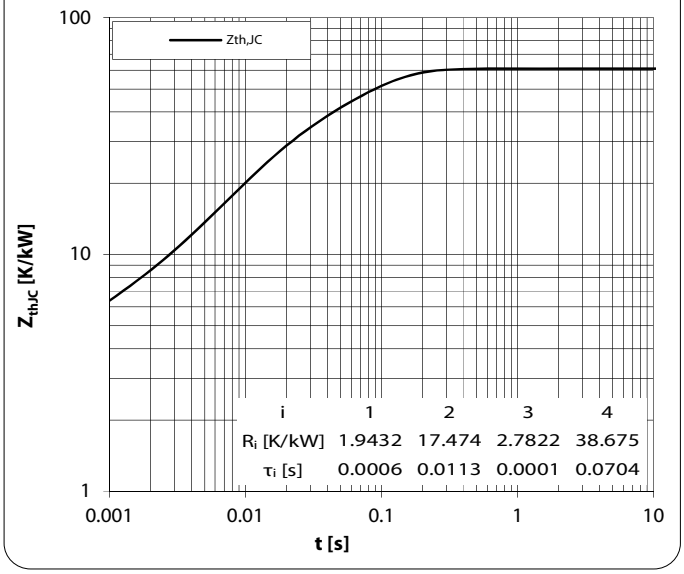
$E_{rec}=f(R_G)$

$I_F=650A$ $V_{CE}=900V$



transient thermal impedance D1/D2

$Z_{thJC}=f(t)$



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1. Status of the data sheet

Depending on the status of the product development, the related technical information is classified as follows:

1.0 Target data sheet

The values in this data sheets are expected to be achieved in the final product.
They are useful for initial calculations and approximations but will not be guaranteed.

1.1 Preliminary data sheet

Values might be missing (marked with tbd).
Given min/max values are valid for the final data sheet too.
Typical values might change. They depend on sufficient measured values.
Major changes will be introduced by a Product Change Notification (PCN).

1.2 Data sheet

In this data sheet all values are existing.
Major changes will be introduced by a Product Change Notification (PCN).

The technical information included in this data sheet specifies semiconductor devices but promises no characteristics. No warranty or guarantee expressed or implied is made regarding delivery, performance or suitability.