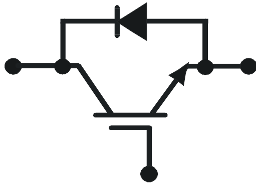
V_{CE} = 6500 V

I_C = 400 A



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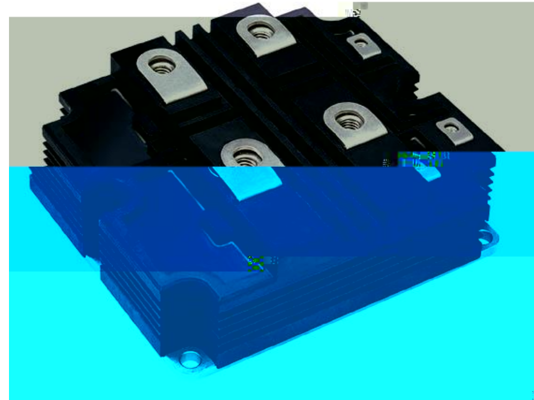
- **Low-loss, rugged SPT chip-set**
- **Smooth switching SPT chip-set for good EMC**
- **High insulation package**
- **AlSiC base-plate for high power cycling capability**
- **AlN substrate for low thermal resistance**



Maximum rated values [1)]

Parameter	Symbol	Conditions	min	max	Unit
Collector-emitter voltage	V_{CES}	V_{GE} = 0 V, T_{vj} ≥ 25 °C		6500	V
DC collector current	I_C	T_c = 85 °C		400	A
Peak collector current	I_{CM}	t_p = 1 ms, T_c = 85 °C		800	A
Gate-emitter voltage	V_{GES}		-20	20	V
Total power dissipation	P_{tot}	T_c = 25 °C, per switch (IGBT)		7350	W
DC forward current	I_F			400	A
Peak forward current	I_{FRM}			800	A
Surge current	I_{FSM}	V_R = 0 V, T_{vj} = 125 °C, t_p = 10 ms, half-sinewave		4000	A
IGBT short circuit SOA	t_{psc}	V_{CC} = 4400 V, $V_{CEM CHIP}$ ≤ 6500 V V_{GE} ≤ 15 V, T_{vj} ≤ 125 °C		10	µs
Isolation voltage	V_{isol}	1 min, f = 50 Hz		10200	V
Junction temperature	T_{vj}		(at) T35.2 0 TD ( ) Tj2Tc ((e		

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IGBT characteristic values [3)]

Parameter	Symbol	Conditions	min	typ	max	Unit
Collector (-emitter) breakdown voltage	$V_{(BR)CES}$	V_{GE} = 0 V, I_C = 10 mA, T_{vj} [illegible]				

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Diode characteristic values [5]

Parameter	Symbol	Conditions		min	typ	max	Unit
Forward voltage [6]	V_F	I_F = 400 A	T_{vj} = 25 °C		3.2	3.8	V
			T_{vj} = 125 °C		3.4	4.0	
Reverse recovery current	I_{rr}	V_{CC} = 3600 V, I_F = 400 A, V_{GE} = ±15 V, R_G = 5.6 Ω L_σ = 280 nH inductive load	T_{vj} = 25 °C		510		A
			T_{vj} = 125 °C		680		
Recovered charge	Q_{rr}		T_{vj} = 25 °C		450		µC
			T_{vj} = 125 °C		770		
Reverse recovery time	t_{rr}		T_{vj} = 25 °C		1840		ns
			T_{vj} = 125 °C		2120		
Reverse recovery energy	E_{rec}		T_{vj} = 25 °C		670		mJ
			T_{vj} = 125 °C		1380		

[5] Characteristic values according to IEC 60747 – 2
[6] Forward voltage is given at chip level

Package properties [7]

Parameter	Symbol	Conditions	min	typ	max	Unit
IGBT thermal resistance junction to case	$R_{th(j-c)IGBT}$				0.016	K/W
Diode thermal resistance junction to case	$R_{th(j-c)DIODE}$				0.032	K/W
IGBT thermal resistance [2] case to heatsink	$R_{th(c-s)IGBT}$	IGBT per switch, λ grease = 1W/m x 0.0				

Electrical configuration C (3)G (2)

O

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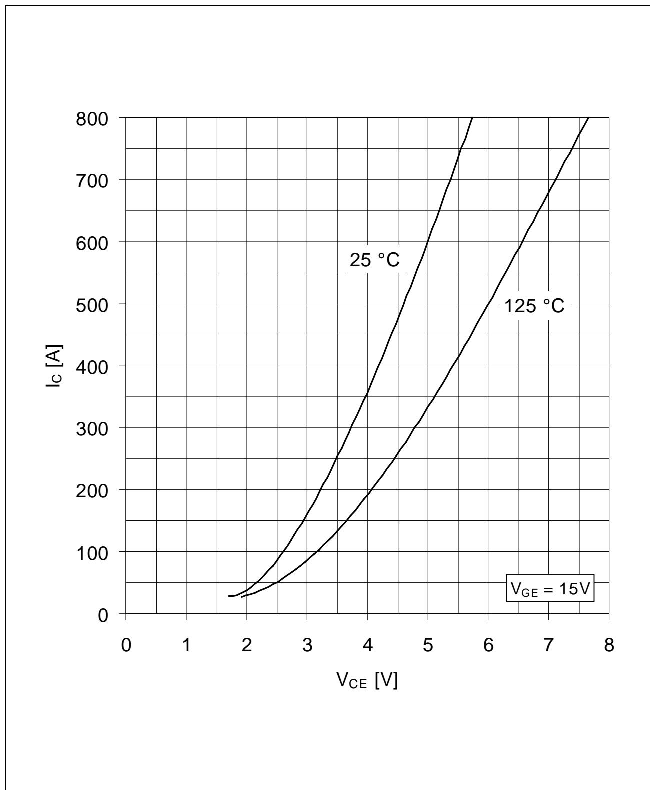


Fig. 1 Typical on-state characteristics, chip level

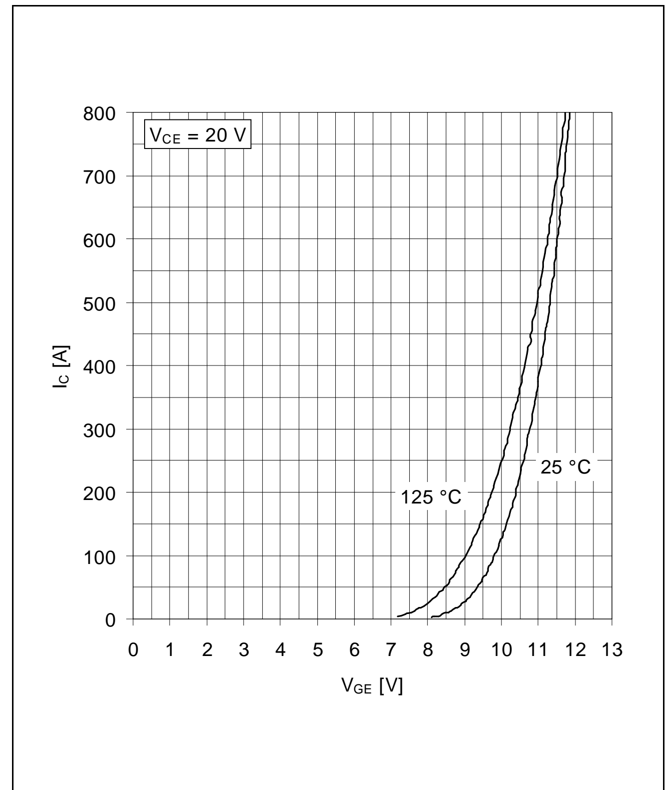
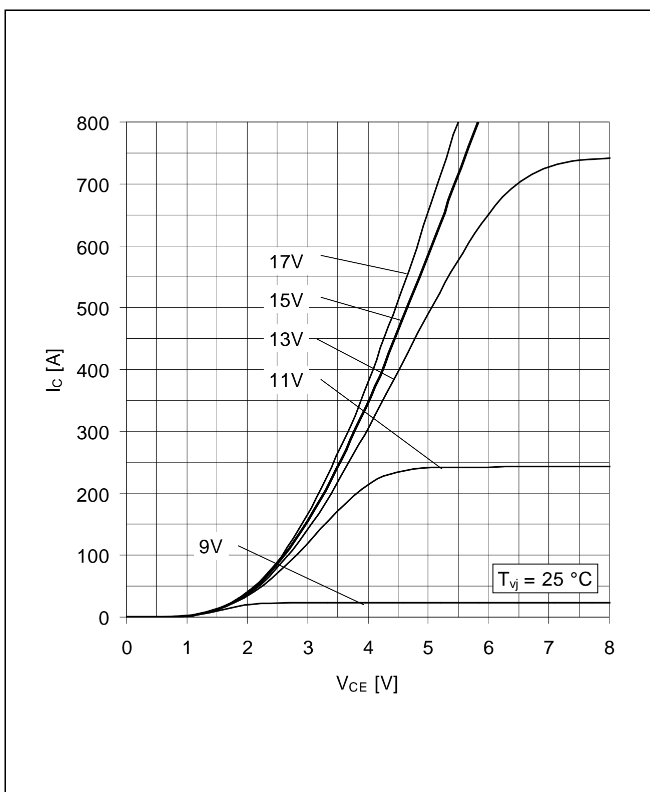
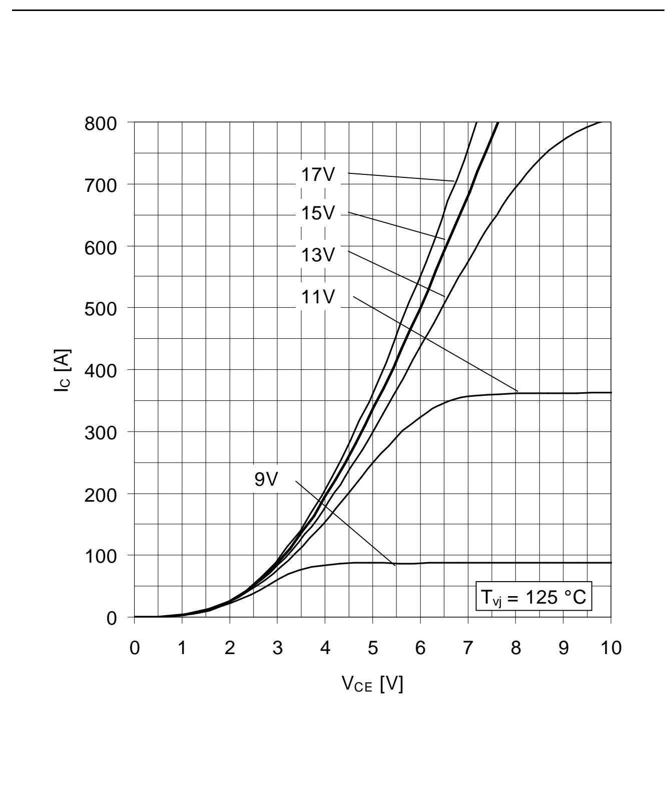
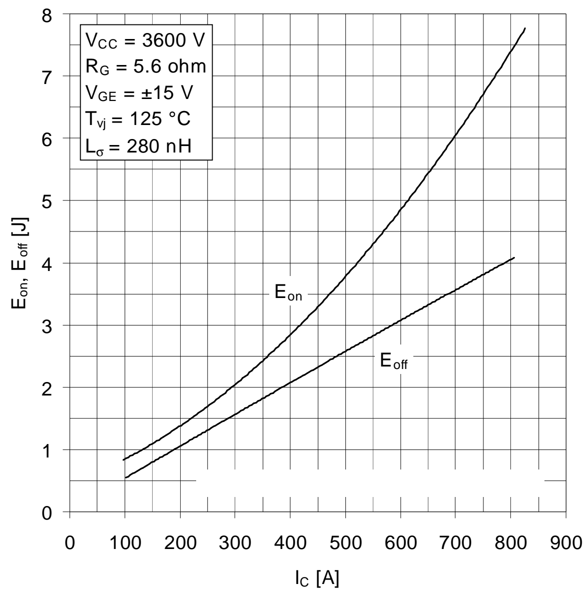


Fig. 2 Typical transfer characteristics, chip level







V GC3600 VR 5.6 ohm

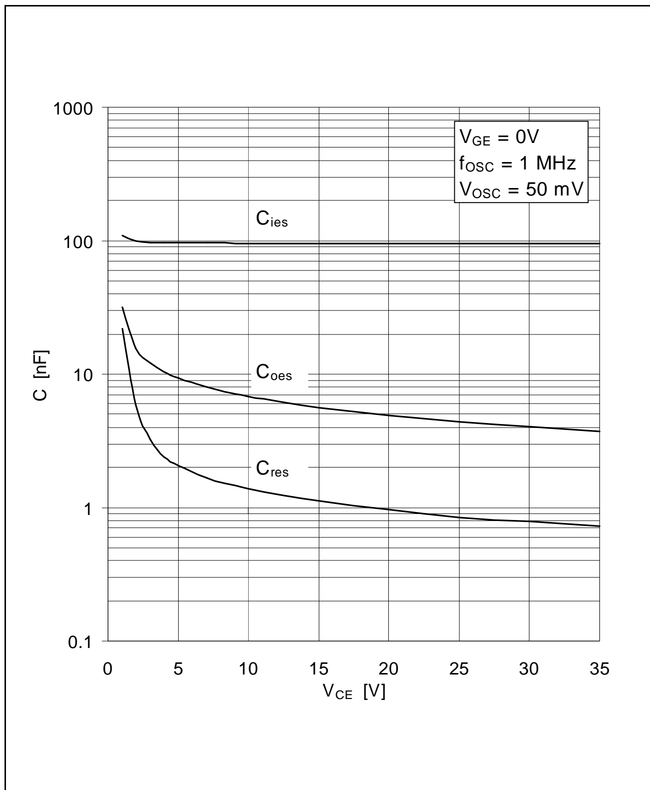


Fig. 9 Typical capacitances vs collector-emitter voltage

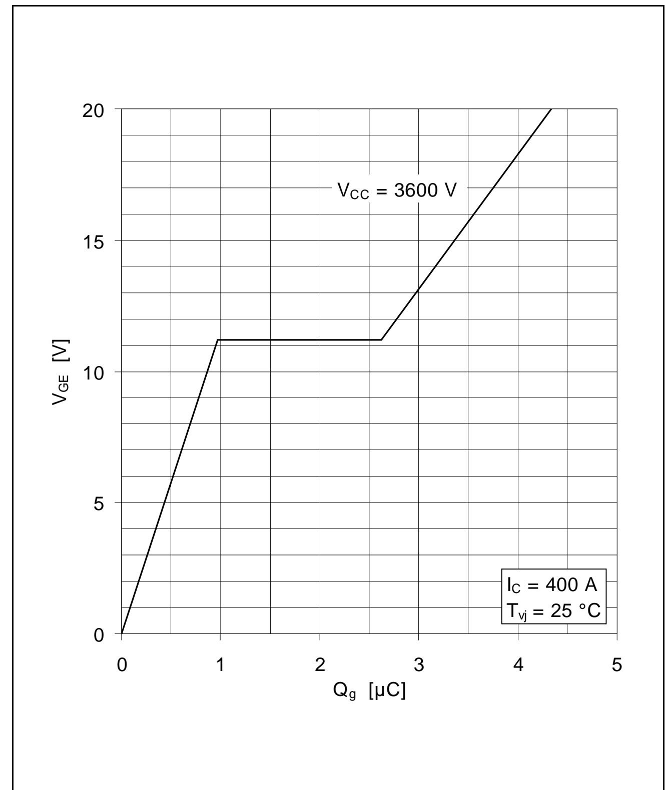


Fig. 10 Typical gate charge characteristics

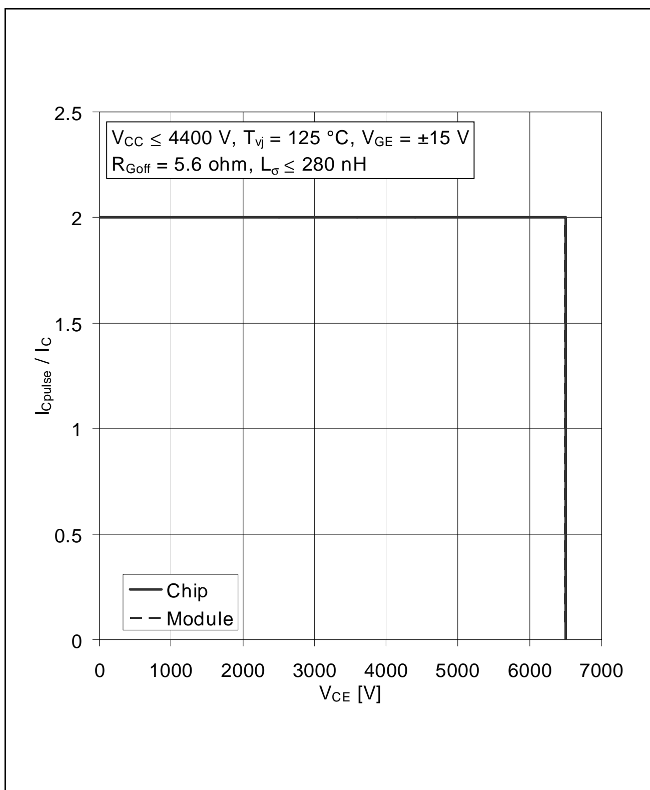


Fig. 11 Turn-off safe operating area (RBSOA)

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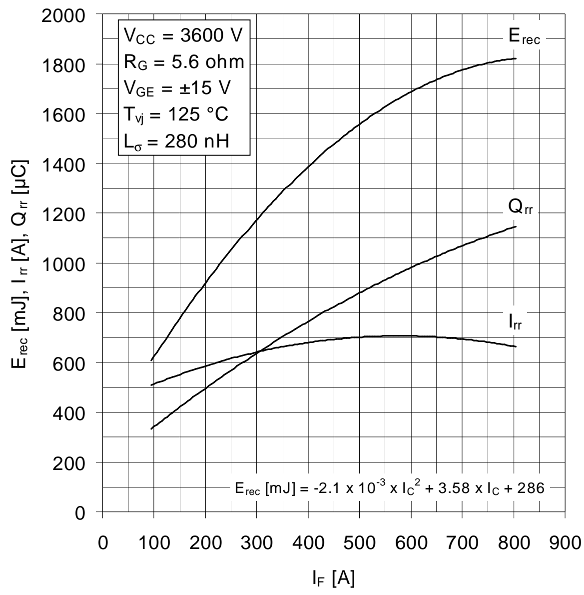

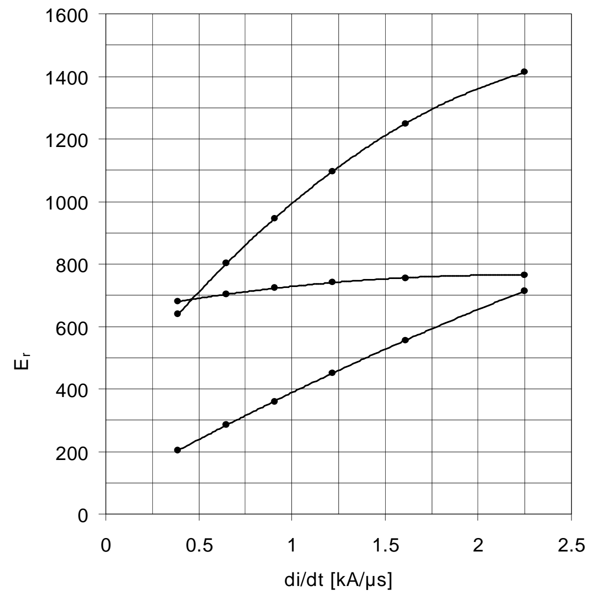

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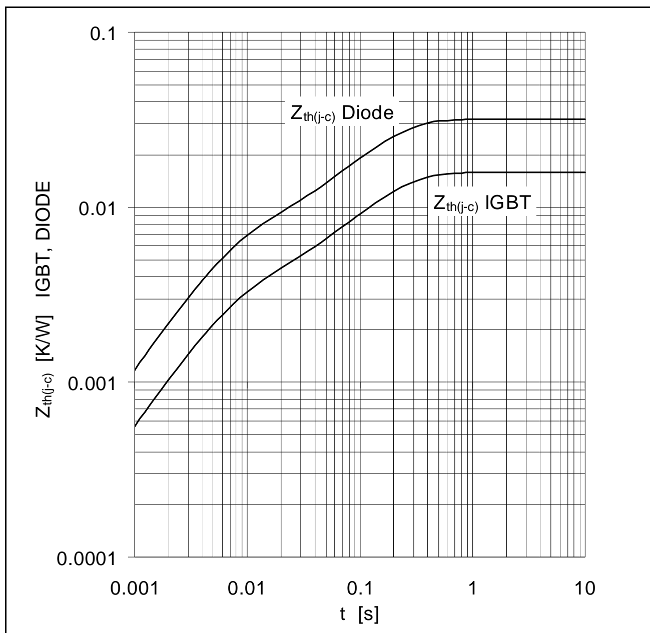

Fig. 16 Thermal impedance vs time

Analytical function for transient thermal impedance:

$$Z_{th\,(j\text{-}c)}(t) = \sum_{i=1}^{n} R_i (1 - e^{-t/\tau_i})$$

	i	1	2	3	4	5
IGBT	R_i(K/kW)	12.75	2.99			
	τ_i(ms)	151	5.84			
DIODE	R_i(K/kW)	25.5	6.3			
	τ_i(ms)	144	5.83			

For detailed information refer to:

- 5SYA 2042 Failure rates of HiPak modules due to cosmic rays
- 5SYA 2043 Load – cycle capability of HiPaks
- 5SYA 2045 Thermal runaway during blocking
- 5SYA 2058 Surge currents for IGBT diodes
- 5SZK 9120 Specification of environmental class for HiPak

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