30-FT12B2A200H706-PK49L01
datasheet

Vincotech

flowBOOST 2 dual	1200 V / 200 A

Topology features

- Auxiliary diodes for FC pre-charge (patent pending)
- Dual Flying Cap Booster
- Kelvin Emitter for improved switching performance
- Temperature sensor

Component features

- High speed switching
- Low collector emitter saturation voltage
- Low turn-off losses
- Optimized for hard switching topologies
- Positive temperature coefficient

Housing features

- Base isolation: Al_2O_3
- Convex shaped baseplate for superior thermal contact
- Cu baseplate
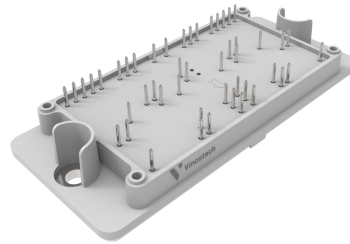- Thermo-mechanical push-and-pull force relief
- Solder pin

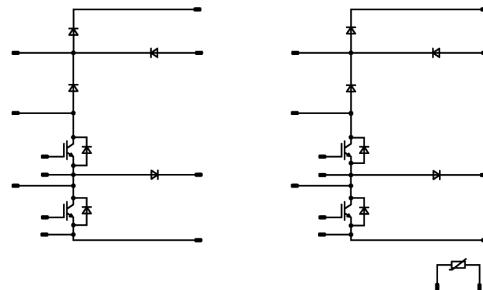### Target applications

- Energy Storage Systems
- Solar Inverters

Types

- 30-FT12B2A200H706-PK49L01

flow 2 13 mm housing

Schematic

Vincotech

Maximum Ratings

T_j = 25 °C, unless otherwise specified

Parameter	Symbol	Conditions		Value	Unit
Inner Boost Switch					
Collector-emitter voltage	V_{CES}			1200	V
Collector current (DC current)	I_C	$T_j = T_{jmax}$	T_s = 80 °C	156	A
Repetitive peak collector current	I_{CRM}	t_p limited by T_{jmax}		600	A
Turn off safe operating area		T_j = 150°C, V_{CE} = 1200 V		600	A
Total power dissipation	P_{tot}	$T_j = T_{jmax}$	T_s = 80 °C	287	W
Gate-emitter voltage	V_{GES}			±20	V
Maximum junction temperature	T_{jmax}			175	°C
Inner Boost Diode					
Peak repetitive reverse voltage	V_{RRM}			1200	V
Forward current (DC current)	I_F	$T_j = T_{jmax}$	T_s = 80 °C	93	A
Repetitive peak forward current	I_{FRM}	t_p limited by T_{jmax}		160	A
Surge (non-repetitive) forward current	I_{FSM}	t_p = 10 µs	T_j = 25 °C	4000	A
Total power dissipation	P_{tot}	$T_j = T_{jmax}$	T_s = 80 °C	206	W
Maximum junction temperature	T_{jmax}			175	°C
Inner Boost Sw. Protection Diode					
Peak repetitive reverse voltage	V_{RRM}			1600	V
Forward current (DC current)	I_F	$T_j = T_{jmax}$	T_s = 80 °C	78	A
Surge (non-repetitive) forward current	I_{FSM}	Single Half Sine Wave, t_p = 10 ms	T_j = 150 °C	480	A
Surge current capability	I^2t			1100	A²s
Total power dissipation	P_{tot}	$T_j = T_{jmax}$	T_s = 80 °C	92	W
Maximum junction temperature	T_{jmax}			150	°C

Maximum Ratings

T_j = 25 °C, unless otherwise specified

Parameter	Symbol	Conditions		Value	Unit
Outer Boost Switch					
Collector-emitter voltage	V_{CES}			1200	V
Collector current (DC current)	I_C	$T_j = T_{jmax}$	T_s = 80 °C	156	A
Repetitive peak collector current	I_{CRM}	t_p limited by T_{jmax}		600	A
Turn off safe operating area		T_j = 150°C, V_{CE} = 1200 V		600	A
Total power dissipation	P_{tot}	$T_j = T_{jmax}$	T_s = 80 °C	287	W
Gate-emitter voltage	V_{GES}			±20	V
Maximum junction temperature	T_{jmax}			175	°C
Outer Boost Diode					
Peak repetitive reverse voltage	V_{RRM}			1200	V
Forward current (DC current)	I_F	$T_j = T_{jmax}$	T_s = 80 °C	93	A
Repetitive peak forward current	I_{FRM}	t_p limited by T_{jmax}		160	A
Surge (non-repetitive) forward current	I_{FSM}	t_p = 10 µs	T_j = 25 °C	4000	A
Total power dissipation	P_{tot}	$T_j = T_{jmax}$	T_s = 80 °C	206	W
Maximum junction temperature	T_{jmax}			175	°C
Outer Boost Sw. Protection Diode					
Peak repetitive reverse voltage	V_{RRM}			1600	V
Forward current (DC current)	I_F	$T_j = T_{jmax}$	T_s = 80 °C	78	A
Surge (non-repetitive) forward current	I_{FSM}	Single Half Sine Wave, t_p = 10 ms	T_j = 150 °C	480	A
Surge current capability	I^2t			1100	A²s
Total power dissipation	P_{tot}	$T_j = T_{jmax}$	T_s = 80 °C	92	W
Maximum junction temperature	T_{jmax}			150	°C

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Maximum Ratings

T_j = 25 °C, unless otherwise specified

Parameter	Symbol	Conditions		Value	Unit
Aux Diode H					
Peak repetitive reverse voltage	V_{RRM}			1200	V
Forward current (DC current)	I_F	$T_j = T_{jmax}$	T_s = 80 °C	74	A
Repetitive peak forward current	I_{FRM}	t_p limited by T_{jmax}		150	A
Surge (non-repetitive) forward current	I_{FSM}	Single Half Sine Wave, t_p = 10 ms	T_j = 25 °C	600	A
Total power dissipation	P_{tot}	$T_j = T_{jmax}$	T_s = 80 °C	145	W
Maximum junction temperature	T_{jmax}			175	°C
Aux Diode L					
Peak repetitive reverse voltage	V_{RRM}			1200	V
Forward current (DC current)	I_F	$T_j = T_{jmax}$	T_s = 80 °C	74	A
Repetitive peak forward current	I_{FRM}	t_p limited by T_{jmax}		150	A
Surge (non-repetitive) forward current	I_{FSM}	Single Half Sine Wave, t_p = 10 ms	T_j = 25 °C	600	A
Total power dissipation	P_{tot}	$T_j = T_{jmax}$	T_s = 80 °C	145	W
Maximum junction temperature	T_{jmax}			175	°C

Module Properties

Thermal Properties

Parameter	Symbol	Conditions		Value	Unit
Storage temperature	T_{stg}			-40...+125	°C
Operation temperature under switching condition	T_{jop}			-40...+(T_{jmax} - 25)	°C

Isolation Properties

Parameter	Symbol	Conditions		Value	Unit
Isolation voltage	V_{isol}	DC Test Voltage*	t_p = 2 s	6000	V
Creepage distance				>12,7	mm
Clearance				>12,7	mm
Comparative Tracking Index	CTI			≥ 600	

*100 % tested in production

Characteristic Values

Parameter	Symbol	Conditions V_{GE} [V] V_{GS} [V]	V_{CE} [V] V_{DS} [V] V_{F} [V]	I_{C} [A] I_{D} [A] I_{F} [A]	T_{j} [°C]	Min	Typ	Max	Unit
Inner Boost Switch									
Static									
Gate-emitter threshold voltage	$V_{GE(th)}$	$V_{CE} = V_{GE}$		0,0032	25	4,7	5,5	6,2	V
Collector-emitter saturation voltage	V_{CEsat}	15		200	25 / 125 / 150		1,78 / 1,94 / 1,98	2,15[1]	V
Collector-emitter cut-off current	I_{CES}	0	1200		25			8	µA
Gate-emitter leakage current	I_{GES}	20	0		25			200	nA
Internal gate resistance	r_{g}						None		Ω
Input capacitance	C_{ies}	f = 100 kHz	0	25	25		26000		pF
Output capacitance	C_{oes}						480		pF
Reverse transfer capacitance	C_{res}						144		pF
Gate charge	Q_{g}	V_{CC} = 960 V	0/15		200	25		1428		nC
Thermal									
Thermal resistance junction to sink[2]	$R_{th(j-s)}$	λ_{paste} = 3,4 W/mK (PSX)					0,33		K/W
Dynamic									
Turn-on delay time	$t_{d(on)}$	R_{gon} = 2 Ω R_{goff} = 2 Ω	±15	700	200	25 / 125 / 150		156,17 / 159,36 / 160,56		ns
Rise time	t_{r}					25 / 125 / 150		12,71 / 14,57 / 14,84		ns
Turn-off delay time	$t_{d(off)}$					25 / 125 / 150		164,98 / 195,33 / 203,29		ns
Fall time	t_{f}					25 / 125 / 150		41,94 / 59,15 / 64,89		ns
Turn-on energy (per pulse)	E_{on}	Q_{rFWD}=0,596 µC Q_{rFWD}=0,564 µC Q_{rFWD}=0,564 µC				25 / 125 / 150		4,39 / 4,77 / 4,79		mWs
Turn-off energy (per pulse)	E_{off}					25 / 125 / 150		6,45 / 9,01 / 9,71		mWs

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Characteristic Values

Parameter	Symbol	Conditions				Values			Unit
		V_{GE} [V] V_{GS} [V]	V_{CE} [V] V_{DS} [V] V_{F} [V]	I_{C} [A] I_{D} [A] I_{F} [A]	T_j [°C]	Min	Typ	Max	

Inner Boost Diode

Static

Parameter	Symbol	Conditions				Values			Unit
Forward voltage	V_F			80	25 125 150		1,49 1,83 1,97	2,6[1] 2,3[1]	V
Reverse leakage current	I_R	V_r = 1200 V			25		4	400	µA

Thermal

Parameter	Symbol	Conditions				Values			Unit
Thermal resistance junction to sink[2]	$R_{th(j-s)}$	λ_{paste} = 3,4 W/mK (PSX)					0,46		K/W

Dynamic

Parameter	Symbol	Conditions				Values			Unit
Peak recovery current	I_{RM}				25 125 150		60,39 62,86 63,37		A
Reverse recovery time	t_{rr}				25 125 150		19,71 16,59 16,4		ns
Recovered charge	Q_r	di/dt=9869 A/µs di/dt=9695 A/µs di/dt=10917 A/µs	±15 700	200	25 125 150		0,596 0,564 0,564		µC
Reverse recovered energy	E_{rec}				25 125 150		0,132 0,114 0,113		mWs
Peak rate of fall of recovery current	$(di_{rr}/dt)_{max}$				25 125 150		13021,85 13169,65 12969,24		A/µs

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Characteristic Values

Parameter	Symbol	Conditions				Values			Unit
		V_{GE} **[V]** V_{GS} **[V]**	V_{CE} **[V]** V_{DS} **[V]** V_{F} **[V]**	I_{C} **[A]** I_{D} **[A]** I_{F} **[A]**	T_{j} **[°C]**	**Min**	**Typ**	**Max**	

Inner Boost Sw. Protection Diode

Static

Parameter	Symbol	Conditions				Values			Unit
Forward voltage	V_{F}			5	25 125 150		0,851 0,725 0,695	1,1[1]	V
Reverse leakage current	I_{R}	V_r = 1600 V			25 150			100 2000	µA

Thermal

Parameter	Symbol	Conditions				Values			Unit
Thermal resistance junction to sink[2]	$R_{th(j-s)}$	λ_{paste} = 3,4 W/mK (PSX)					0,76		K/W

Vincotech

Characteristic Values

Parameter	Symbol	Conditions					Values			Unit
			V_{GE} [V] V_{GS} [V]	V_{CE} [V] V_{DS} [V] V_{F} [V]	I_{C} [A] I_{D} [A] I_{F} [A]	T_{j} [°C]	Min	Typ	Max	
Outer Boost Switch										
Static										
Gate-emitter threshold voltage	$V_{GE(th)}$	$V_{CE} = V_{GE}$			0,0032	25	4,7	5,5	6,2	V
Collector-emitter saturation voltage	V_{CEsat}		15		200	25 125 150		1,78 1,94 1,98	2,15[1]	V
Collector-emitter cut-off current	I_{CES}		0	1200		25			8	µA
Gate-emitter leakage current	I_{GES}		20	0		25			200	nA
Internal gate resistance	r_{g}							None		Ω
Input capacitance	C_{ies}	f = 100 kHz	0	25		25		26000		pF
Output capacitance	C_{oes}							480		pF
Reverse transfer capacitance	C_{res}							144		pF
Gate charge	Q_{g}	V_{CC} = 960 V	0/15		200	25		1428		nC
Thermal										
Thermal resistance junction to sink[2]	$R_{th(j\text{-}s)}$	λ_{paste} = 3,4 W/mK (PSX)						0,33		K/W
Dynamic										
Turn-on delay time	$t_{d(on)}$					25 125 150		151,52 154,15 154,96		ns
Rise time	t_{r}	R_{gon} = 2 Ω R_{goff} = 2 Ω				25 125 150		14,63 16,2 16,62		ns
Turn-off delay time	$t_{d(off)}$		±15	700	200	25 125 150		166,54 202,95 212,16		ns
Fall time	t_{f}					25 125 150		33,15 66,75 79,24		ns
Turn-on energy (per pulse)	E_{on}	Q_{rFWD}=0,53 µC Q_{rFWD}=0,552 µC Q_{rFWD}=0,549 µC				25 125 150		3,61 3,73 3,9		mWs
Turn-off energy (per pulse)	E_{off}					25 125 150		5,27 9,63 10,8		mWs

Vincotech

Characteristic Values

Parameter	Symbol	Conditions				Values			Unit
		V_{GE} [V] V_{GS} [V]	V_{CE} [V] V_{DS} [V] V_{F} [V]	I_{C} [A] I_{D} [A] I_{F} [A]	T_{j} [°C]	Min	Typ	Max	

Outer Boost Diode

Static

Parameter	Symbol	Conditions				Values			Unit
Forward voltage	V_{F}			80	25 125 150		1,49 1,83 1,97	2,6[1] 2,3[1]	V
Reverse leakage current	I_{R}	V_{r} = 1200 V			25		4	400	µA

Thermal

Parameter	Symbol	Conditions				Values			Unit
Thermal resistance junction to sink[2]	$R_{th(j-s)}$	λ_{paste} = 3,4 W/mK (PSX)					0,46		K/W

Dynamic

Parameter	Symbol	Conditions				Values			Unit
Peak recovery current	I_{RM}	di/dt=14910 A/µs di/dt=12592 A/µs di/dt=11773 A/µs	±15	700	200	25 125 150		69,22 72,5 72,41		A
Reverse recovery time	t_{rr}					25 125 150		12,5 12,74 12,81		ns
Recovered charge	Q_{r}					25 125 150		0,53 0,552 0,549		µC
Reverse recovered energy	E_{rec}					25 125 150		0,129 0,14 0,14		mWs
Peak rate of fall of recovery current	$(di_{rr}/dt)_{max}$					25 125 150		18300,95 17130,43 17682,21		A/µs

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Characteristic Values

Parameter	Symbol	Conditions				Values			Unit
		V_{GE} **[V]** V_{GS} **[V]**	V_{CE} **[V]** V_{DS} **[V]** V_{F} **[V]**	I_{C} **[A]** I_{D} **[A]** I_{F} **[A]**	T_{j} **[°C]**	**Min**	**Typ**	**Max**	

Outer Boost Sw. Protection Diode

Static

Parameter	Symbol	Conditions				Values			Unit
Forward voltage	V_{F}			5	25 125 150		0,851 0,725 0,695	1,1[1]	V
Reverse leakage current	I_{R}	V_{r} = 1600 V			25 150			100 2000	µA

Thermal

Parameter	Symbol	Conditions				Values			Unit
Thermal resistance junction to sink[2]	$R_{th(j\text{-}s)}$	λ_{paste} = 3,4 W/mK (PSX)					0,76		K/W

Aux Diode H

Static

Parameter	Symbol	Conditions				Values			Unit
Forward voltage	V_{F}			75	25 125 150		2,59 2,16 2,07	3,3[1]	V
Reverse leakage current	I_{R}	V_{r} = 1200 V			25 150			250 2000	µA

Thermal

Parameter	Symbol	Conditions				Values			Unit
Thermal resistance junction to sink[2]	$R_{th(j\text{-}s)}$	λ_{paste} = 3,4 W/mK (PSX)					0,66		K/W

Characteristic Values

Parameter	Symbol	Conditions				Values			Unit
		V_{GE} [V] V_{GS} [V]	V_{CE} [V] V_{DS} [V] V_{F} [V]	I_{C} [A] I_{D} [A] I_{F} [A]	T_{j} [°C]	Min	Typ	Max	
Aux Diode L									
Static									
Forward voltage	V_{F}			75	25 125 150		2,59 2,16 2,07	3,3[1]	V
Reverse leakage current	I_{R}	V_{r} = 1200 V			25 150			250 2000	µA
Thermal									
Thermal resistance junction to sink[2]	$R_{th(j-s)}$	λ_{paste} = 3,4 W/mK (PSX)					0,66		K/W
Thermistor									
Static									
Rated resistance	R				25		22		kΩ
Deviation of R100	$\Delta_{R/R}$	R_{100} = 1484 Ω			100	-5		5	%
Power dissipation	P				25		130		mW
Power dissipation constant	d				25		1,5		mW/K
B-value	$B_{(25/50)}$	Tol. ±1 %					3962		K
B-value	$B_{(25/100)}$	Tol. ±1 %					4000		K
Vincotech Thermistor Reference								I	

[1] Value at chip level

[2] Only valid with pre-applied Vincotech thermal interface material.

Inner Boost Switch Characteristics

figure 1.	IGBT

Typical output characteristics
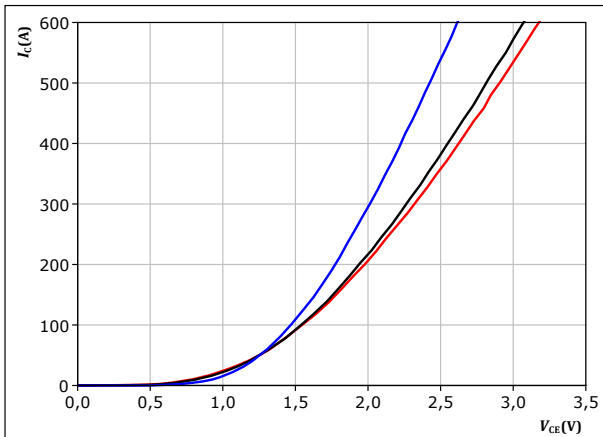
$I_C = f(V_{CE})$

$t_p =$	250	µs		**25 °C**
$V_{GE} =$	15	V	T_j:	**125 °C**
				150 °C

figure 2.	IGBT

Typical output characteristics

$I_C = f(V_{CE})$

V_{GE}:
- 7 V
- 8 V
- 9 V
- 10 V
- 11 V
- 12 V
- 13 V
- 14 V
- 15 V
- 16 V
- 17 V

$t_p =$	250	µs
$T_j =$	150	°C
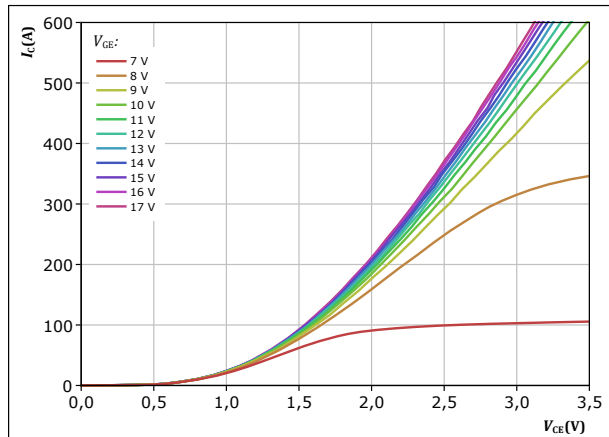
V_{GE} from 7 V to 17 V in steps of 1 V

figure 3.	IGBT

Typical transfer characteristics

$I_C = f(V_{GE})$
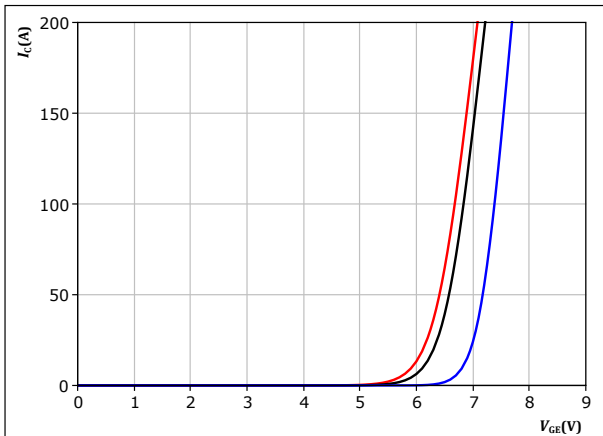
$t_p =$	250	µs		**25 °C**
$V_{CE} =$	48	V	T_j:	**125 °C**
				150 °C

figure 4.	IGBT

Transient thermal impedance as a function of pulse width
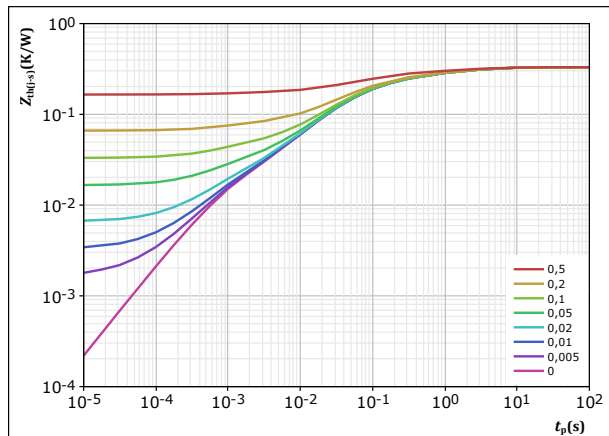
$Z_{th(j-s)} = f(t_p)$

- 0,5
- 0,2
- 0,1
- 0,05
- 0,02
- 0,01
- 0,005
- 0

$D =$	t_p / T	
$R_{th(j-s)} =$	0,331	K/W

IGBT thermal model values

R (K/W)	τ (s)
3,72E-02	4,28E+00
7,68E-02	6,09E-01
1,42E-01	7,68E-02
6,11E-02	1,66E-02
1,38E-02	8,44E-04

Inner Boost Switch Characteristics

figure 5.	IGBT

Safe operating area

I_C = f(V_{CE})
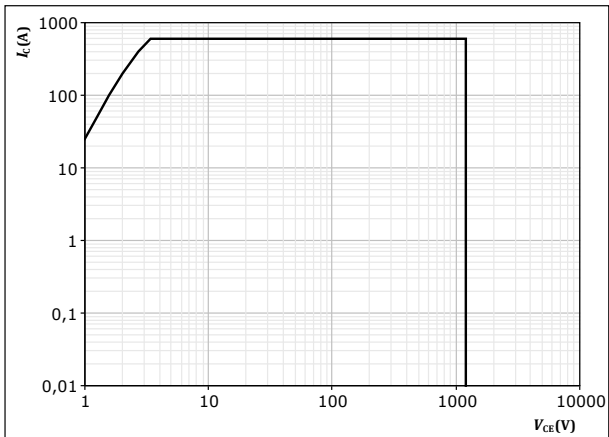
D = single pulse

T_s =	80	°C
V_{GE} =	15	V
T_j =	T_{jmax}	

figure 6.	IGBT

Gate voltage vs gate charge

V_{GE} = f(Q_g)

960 V
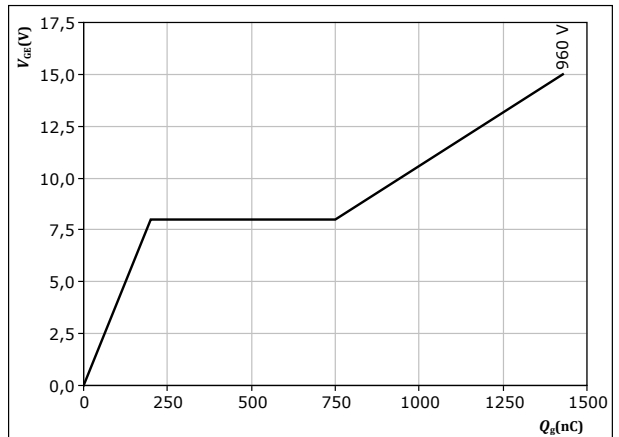
I_C =	200	A
T_j =	25	°C

Inner Boost Diode Characteristics

figure 7.	FWD

Typical forward characteristics

$I_F = f(V_F)$

$t_p =$ 250   µs

T_j: — 25 °C
     — 125 °C
     — 150 °C
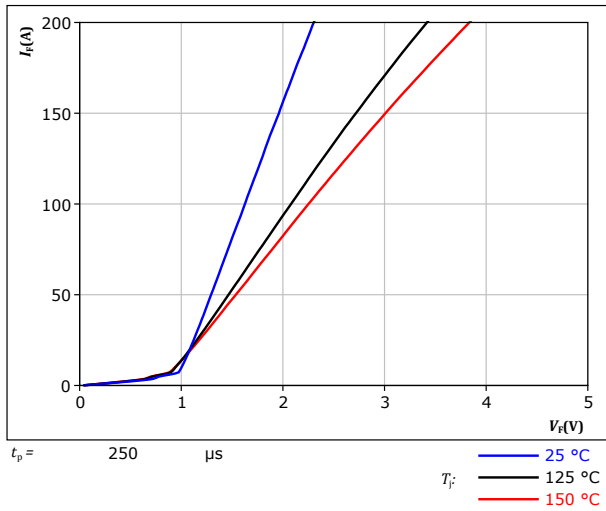
figure 8.	FWD

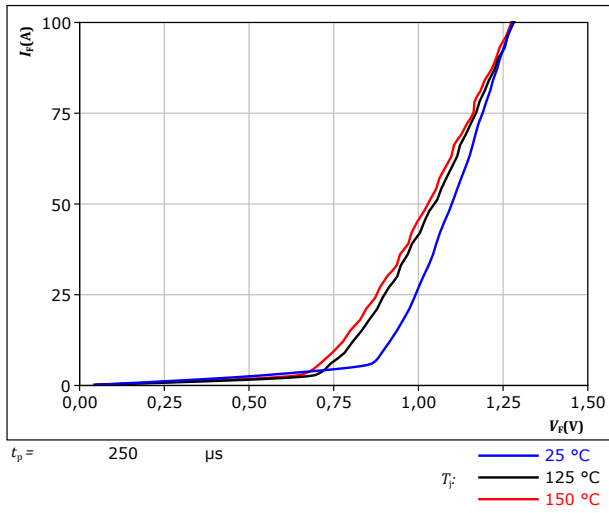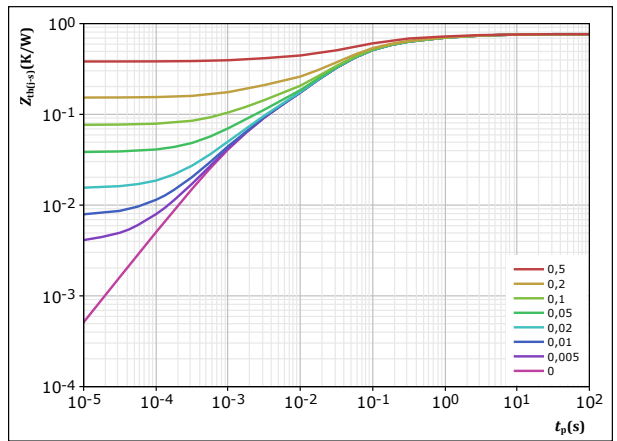**Transient thermal impedance as a function of pulse width**
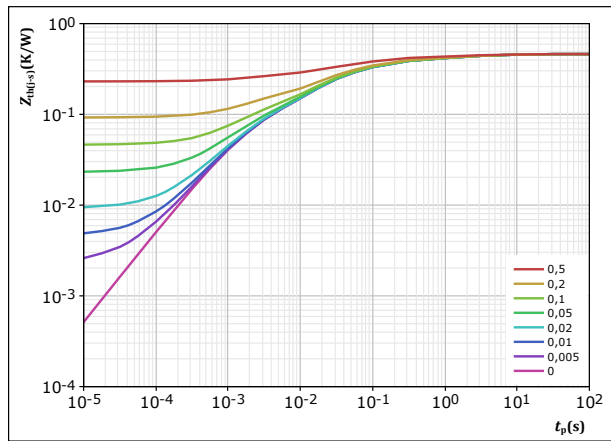
$Z_{th(j-s)} = f(t_p)$

$D =$ t_p / T

$R_{th(j-s)} =$ 0,461   K/W

FWD thermal model values

R (K/W)	τ (s)
2,93E-02	6,24E+00
5,65E-02	9,43E-01
1,42E-01	9,56E-02
1,69E-01	1,84E-02
6,47E-02	1,59E-03

Inner Boost Sw. Protection Diode Characteristics

figure 9.	Rectifier

Typical forward characteristics

$I_F = f(V_F)$

$t_p =$ 250 µs

T_j: 25 °C / 125 °C / 150 °C
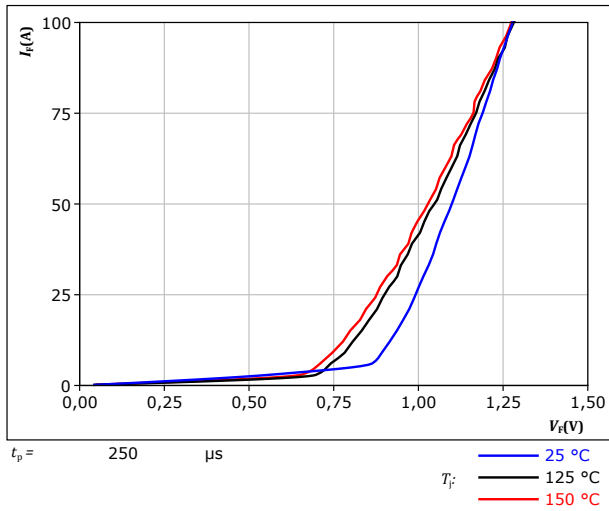
figure 10.	Rectifier

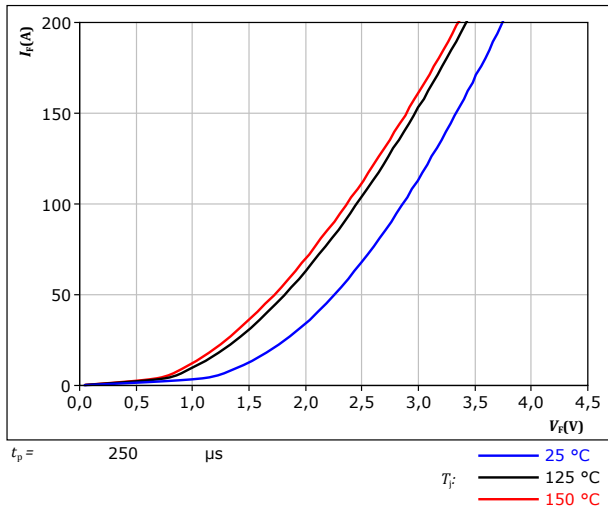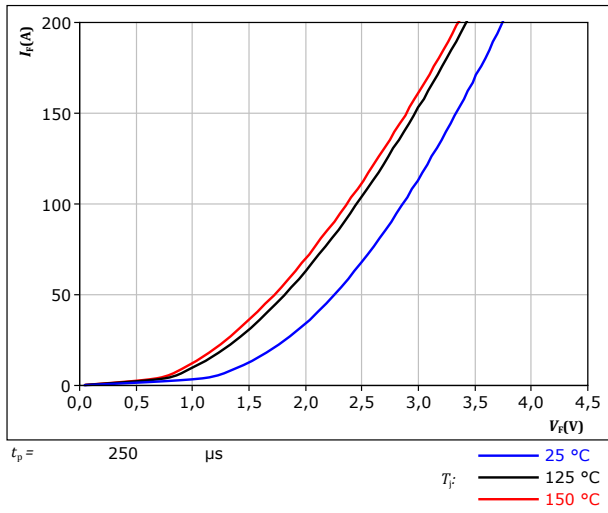**Transient thermal impedance as a function of pulse width**
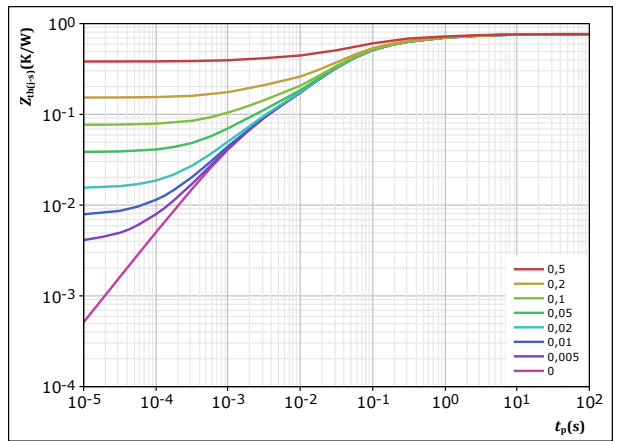
$Z_{th(j-s)} = f(t_p)$

$D = t_p / T$

$R_{th(j-s)} =$ 0,765 K/W

Rectifier thermal model values

R (K/W)	τ (s)
4,68E-02	5,24E+00
1,43E-01	5,88E-01
3,57E-01	7,04E-02
1,61E-01	1,86E-02
5,74E-02	1,54E-03

Outer Boost Switch Characteristics

figure 11.	IGBT

Typical output characteristics
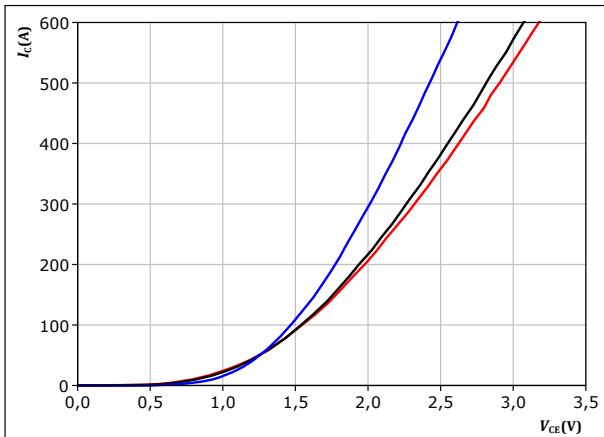
$I_C = f(V_{CE})$

$t_p =$	250	µs		25 °C
$V_{GE} =$	15	V	T_j:	125 °C
				150 °C

figure 12.	IGBT

Typical output characteristics

$I_C = f(V_{CE})$

V_{GE}:
- 7 V
- 8 V
- 9 V
- 10 V
- 11 V
- 12 V
- 13 V
- 14 V
- 15 V
- 16 V
- 17 V

$t_p =$	250	µs
$T_j =$	150	°C
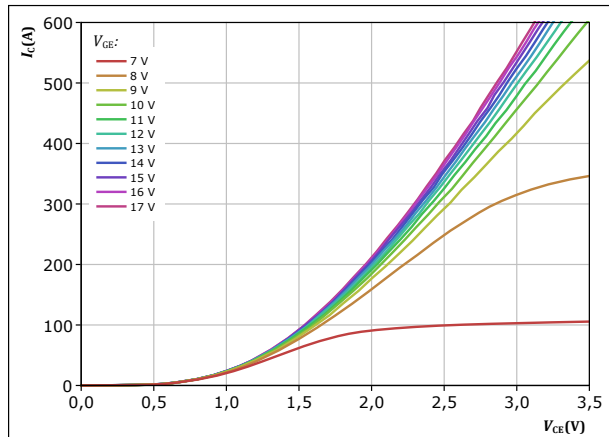
V_{GE} from 7 V to 17 V in steps of 1 V

figure 13.	IGBT

Typical transfer characteristics

$I_C = f(V_{GE})$
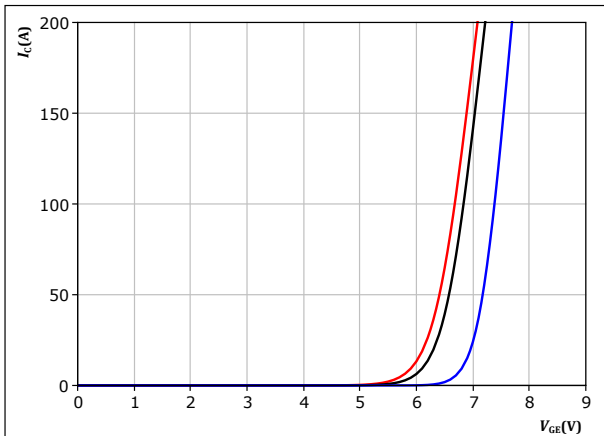
$t_p =$	250	µs		25 °C
$V_{CE} =$	48	V	T_j:	125 °C
				150 °C

figure 14.	IGBT

Transient thermal impedance as a function of pulse width
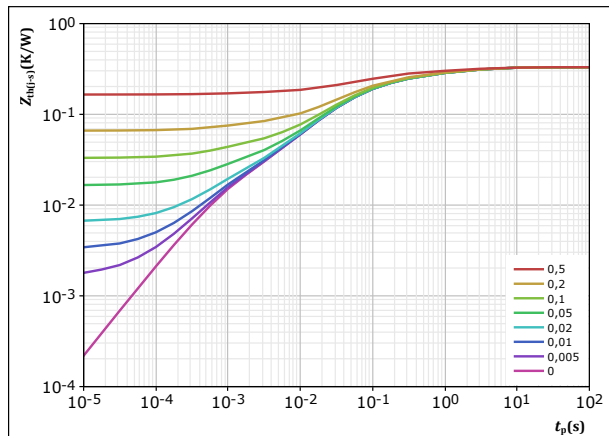
$Z_{th(j-s)} = f(t_p)$

- 0,5
- 0,2
- 0,1
- 0,05
- 0,02
- 0,01
- 0,005
- 0

$D =$	t_p / T	
$R_{th(j-s)} =$	0,331	K/W

IGBT thermal model values

R (K/W)	τ (s)
3,72E-02	4,28E+00
7,68E-02	6,09E-01
1,42E-01	7,68E-02
6,11E-02	1,66E-02
1,38E-02	8,44E-04

Outer Boost Switch Characteristics

figure 15.   **IGBT**

Safe operating area

$I_C = f(V_{CE})$
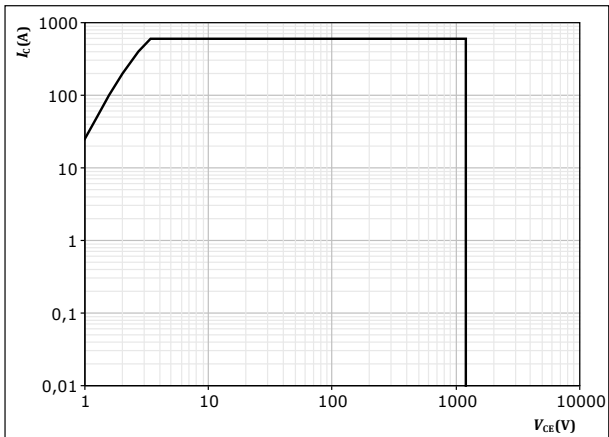
D = single pulse

$T_s =$	80	°C
$V_{GE} =$	15	V
$T_j =$	T_{jmax}	

figure 16.   **IGBT**

Gate voltage vs gate charge

$V_{GE} = f(Q_g)$
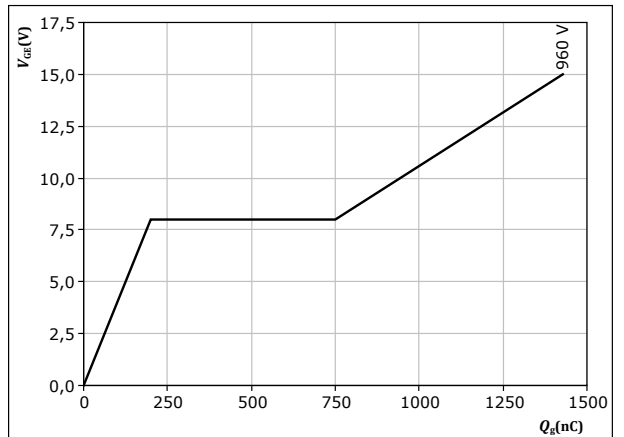
$I_C =$	200	A
$T_j =$	25	°C

Outer Boost Diode Characteristics

figure 17. FWD

Typical forward characteristics

$I_F = f(V_F)$

$t_p = $ 250 μs

T_j: 25 °C
125 °C
150 °C
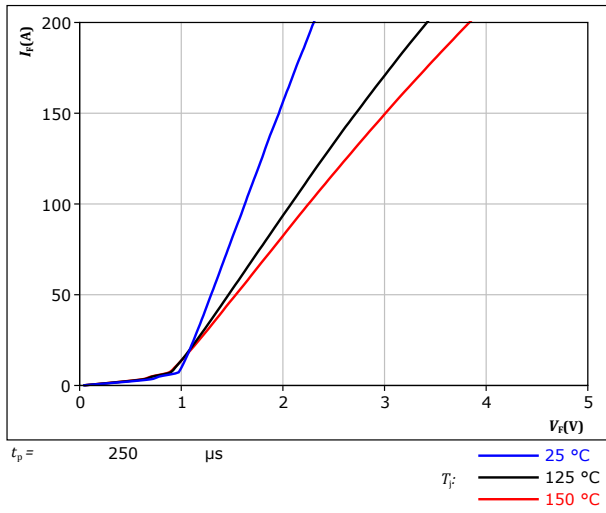
figure 18. FWD

Transient thermal impedance as a function of pulse width
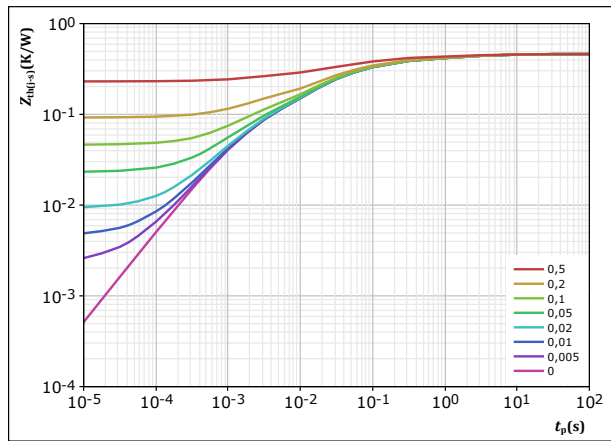
$Z_{th(j-s)} = f(t_p)$

$D = $ t_p / T

$R_{th(j-s)} = $ 0,461 K/W

FWD thermal model values

R (K/W)	τ (s)
2,93E-02	6,24E+00
5,65E-02	9,43E-01
1,42E-01	9,56E-02
1,69E-01	1,84E-02
6,47E-02	1,59E-03

Outer Boost Sw. Protection Diode Characteristics

figure 19.	Rectifier

Typical forward characteristics

$I_F = f(V_F)$

$t_p = $ 250 µs

T_j:
- 25 °C
- 125 °C
- 150 °C

figure 20.	Rectifier

Transient thermal impedance as a function of pulse width

$Z_{th(j-s)} = f(t_p)$

legend: 0,5 / 0,2 / 0,1 / 0,05 / 0,02 / 0,01 / 0,005 / 0

$D = t_p / T$

$R_{th(j-s)} = $ 0,765 K/W

Rectifier thermal model values

R (K/W)	τ (s)
4,68E-02	5,24E+00
1,43E-01	5,88E-01
3,57E-01	7,04E-02
1,61E-01	1,86E-02
5,74E-02	1,54E-03

Aux Diode H Characteristics

figure 21.	FWD

Typical forward characteristics

$I_F = f(V_F)$

$t_p = $ 250 µs

T_j:
- 25 °C
- 125 °C
- 150 °C

figure 22.	FWD

Transient thermal impedance as a function of pulse width
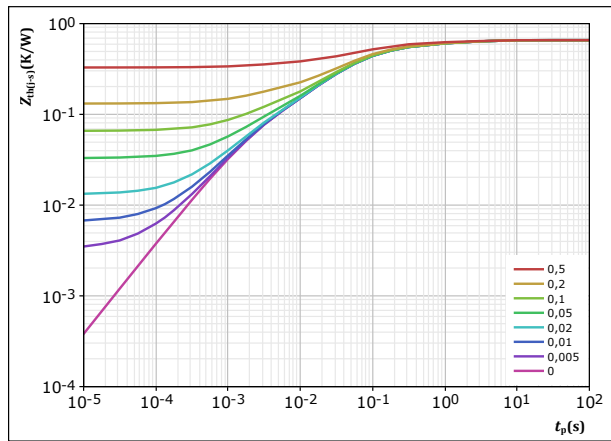
$Z_{th(j-s)} = f(t_p)$

Legend:
- 0,5
- 0,2
- 0,1
- 0,05
- 0,02
- 0,01
- 0,005
- 0

$D = $ t_p / T

$R_{th(j-s)} = $ 0,657 K/W

FWD thermal model values

R (K/W)	τ (s)
6,51E-02	2,52E+00
1,04E-01	3,73E-01
3,01E-01	7,08E-02
1,34E-01	1,87E-02
5,30E-02	2,00E-03

Aux Diode L Characteristics

<table>
<tr><td>figure 23.</td><td align="right">FWD</td></tr>
</table>

Typical forward characteristics

$I_F = f(V_F)$

$t_p = $ 250   µs

T_j: — 25 °C
   — 125 °C
   — 150 °C

<table>
<tr><td>figure 24.</td><td align="right">FWD</td></tr>
</table>

Transient thermal impedance as a function of pulse width
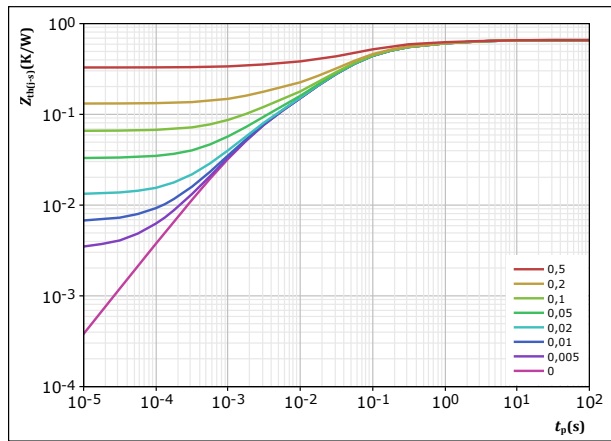
$Z_{th(j-s)} = f(t_p)$

$D = $ t_p / T

$R_{th(j-s)} = $ 0,657   K/W

FWD thermal model values

R (K/W)	τ (s)
6,51E-02	2,52E+00
1,04E-01	3,73E-01
3,01E-01	7,08E-02
1,34E-01	1,87E-02
5,30E-02	2,00E-03

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Thermistor Characteristics

figure 25.	Thermistor

Typical NTC characteristic as function of temperature

$R_T = f(T)$
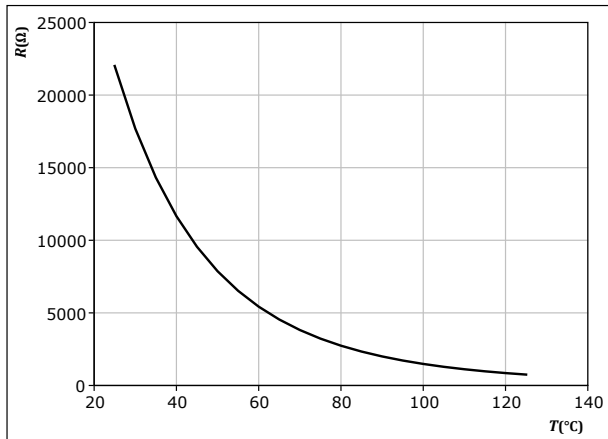
Inner Boost Switching Characteristics

figure 26.	IGBT

Typical switching energy losses as a function of collector current

$E = f(I_C)$
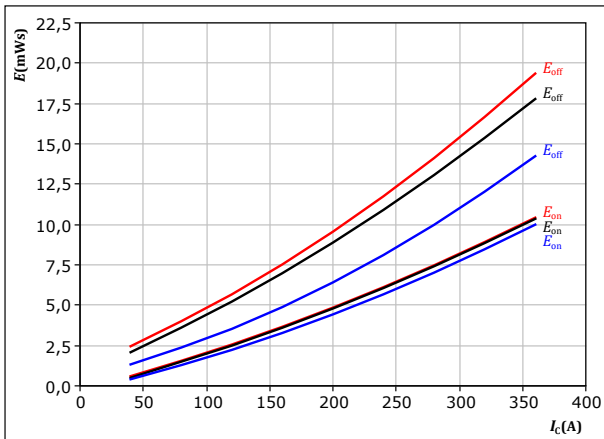
With an inductive load at

				T_j:	— 25 °C
V_{CE} =	700	V			— 125 °C
V_{GE} =	±15	V			— 150 °C
R_{gon} =	2	Ω			
R_{goff} =	2	Ω			

figure 27.	IGBT

Typical switching energy losses as a function of IGBT turn on gate resistor

$E = f(R_g)$
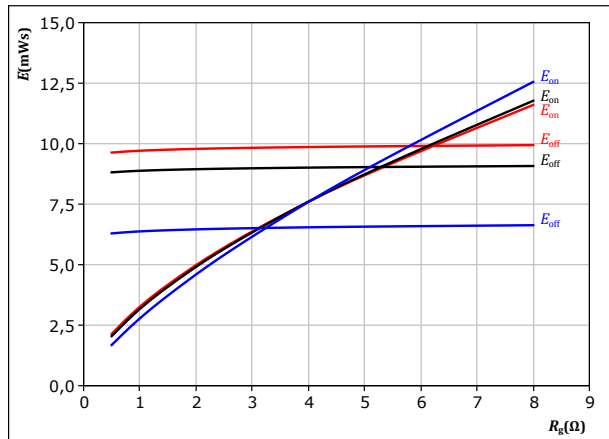
With an inductive load at

				T_j:	— 25 °C
V_{CE} =	700	V			— 125 °C
V_{GE} =	±15	V			— 150 °C
I_C =	200	A			

figure 28.	FWD

Typical reverse recovered energy loss as a function of collector current

$E_{rec} = f(I_C)$
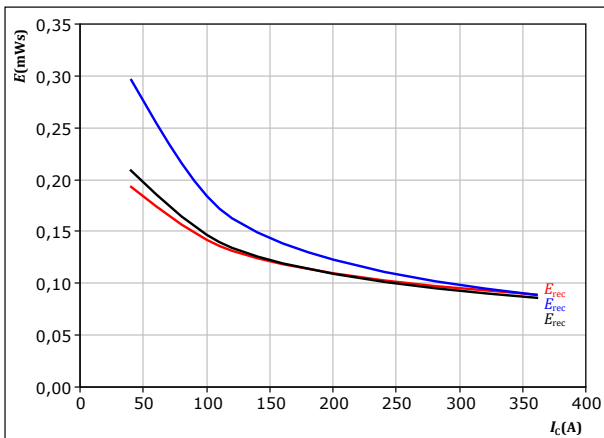
With an inductive load at

				T_j:	— 25 °C
V_{CE} =	700	V			— 125 °C
V_{GE} =	±15	V			— 150 °C
R_{gon} =	2	Ω			

figure 29.	FWD

Typical reverse recovered energy loss as a function of IGBT turn on gate resistor

$E_{rec} = f(R_g)$
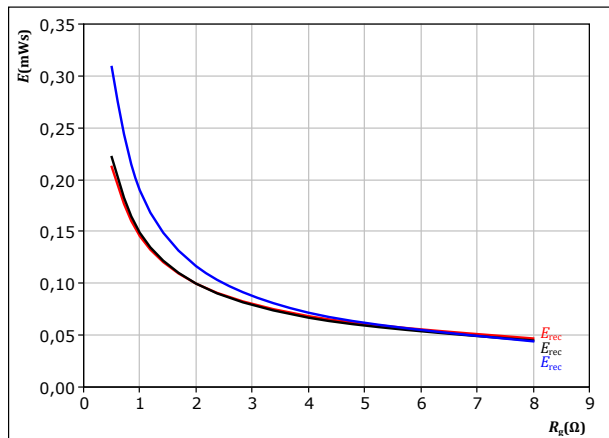
With an inductive load at

				T_j:	— 25 °C
V_{CE} =	700	V			— 125 °C
V_{GE} =	±15	V			— 150 °C
I_C =	200	A			

Inner Boost Switching Characteristics

figure 30. **IGBT**

Typical switching times as a function of collector current

$t = f(I_c)$
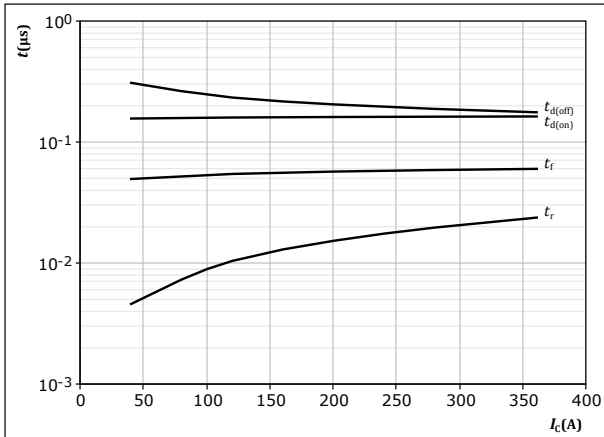
With an inductive load at

$T_j =$	150	°C
$V_{CE} =$	700	V
$V_{GE} =$	±15	V
$R_{gon} =$	2	Ω
$R_{goff} =$	2	Ω

figure 31. **IGBT**

Typical switching times as a function of IGBT turn on gate resistor

$t = f(R_g)$
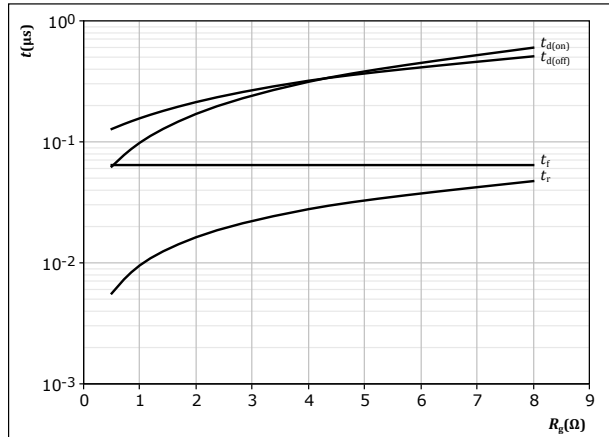
With an inductive load at

$T_j =$	150	°C
$V_{CE} =$	700	V
$V_{GE} =$	±15	V
$I_C =$	200	A

figure 32. **FWD**

Typical reverse recovery time as a function of collector current

$t_{rr} = f(I_c)$
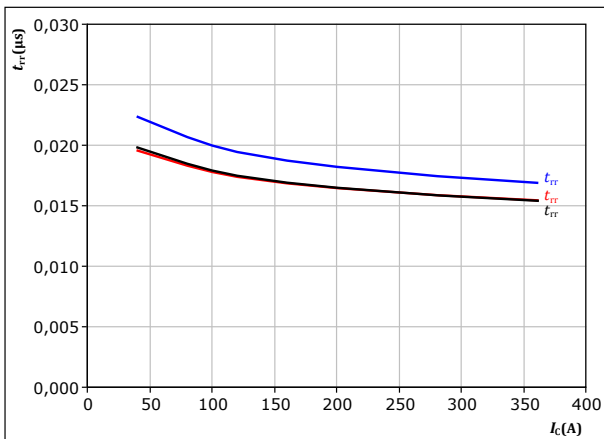
With an inductive load at

$V_{CE} =$	700	V		25 °C
$V_{GE} =$	±15	V	T_j:	125 °C
$R_{gon} =$	2	Ω		150 °C

figure 33. **FWD**

Typical reverse recovery time as a function of IGBT turn on gate resistor

$t_{rr} = f(R_{gon})$
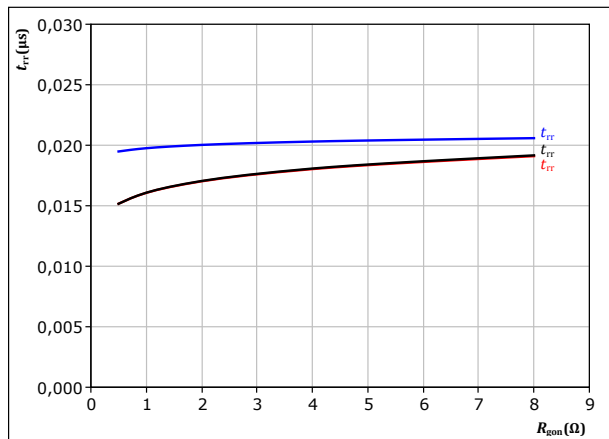
With an inductive load at

$V_{CE} =$	700	V		25 °C
$V_{GE} =$	±15	V	T_j:	125 °C
$I_C =$	200	A		150 °C

Inner Boost Switching Characteristics

figure 34.	FWD

Typical recovered charge as a function of collector current

Q_r = f(I_c)

With an inductive load at

V_{CE} =	700	V	
V_{GE} =	±15	V	
R_{gon} =	2	Ω	

T_j:
- 25 °C (blue)
- 125 °C (black)
- 150 °C (red)
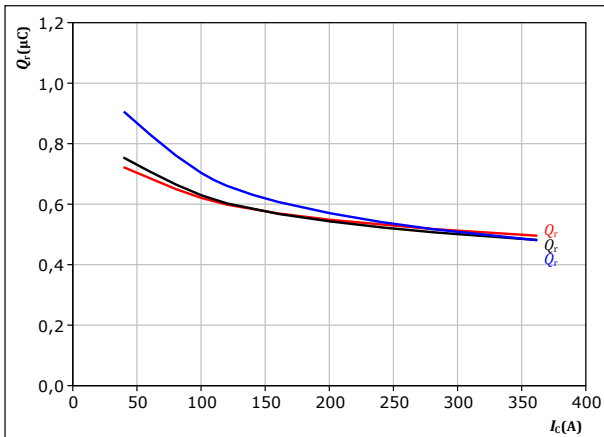
figure 35.	FWD

Typical recovered charge as a function of IGBT turn on gate resistor

Q_r = f(R_{gon})

With an inductive load at

V_{CE} =	700	V	
V_{GE} =	±15	V	
I_C =	200	A	

T_j:
- 25 °C (blue)
- 125 °C (black)
- 150 °C (red)
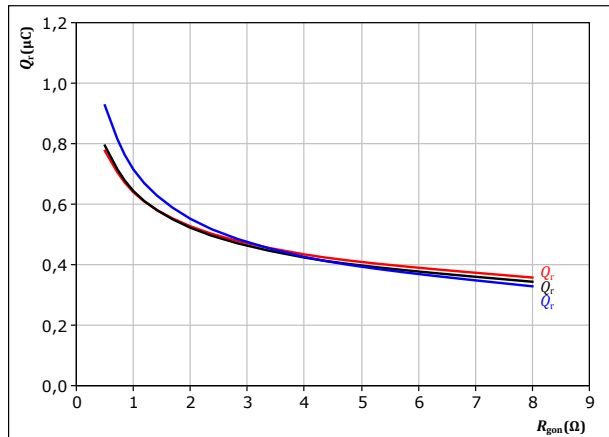
figure 36.	FWD

Typical peak reverse recovery current as a function of collector current

I_{RM} = f(I_C)

With an inductive load at

V_{CE} =	700	V	
V_{GE} =	±15	V	
R_{gon} =	2	Ω	

T_j:
- 25 °C (blue)
- 125 °C (black)
- 150 °C (red)
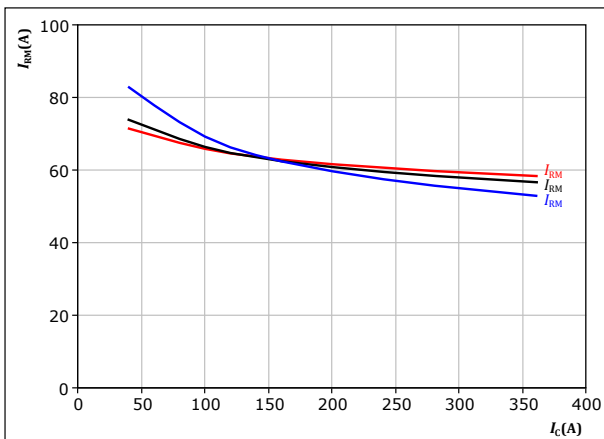
figure 37.	FWD

Typical peak reverse recovery current as a function of IGBT turn on gate resistor

I_{RM} = f(R_{gon})

With an inductive load at

V_{CE} =	700	V	
V_{GE} =	±15	V	
I_C =	200	A	

T_j:
- 25 °C (blue)
- 125 °C (black)
- 150 °C (red)
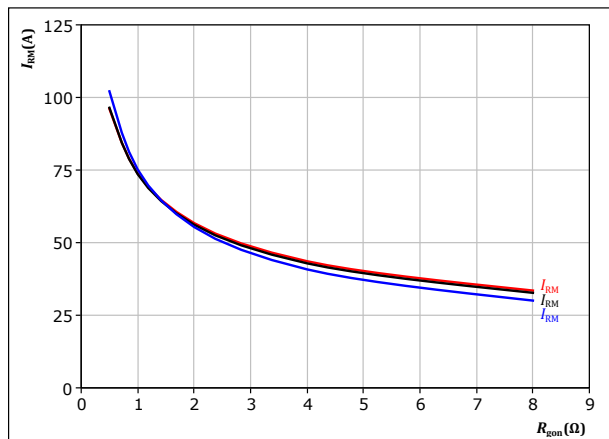
Inner Boost Switching Characteristics

figure 38.   **FWD**

Typical rate of fall of forward and reverse recovery current as a function of collector current

di_F/dt, di_{rr}/dt = f(I_C)
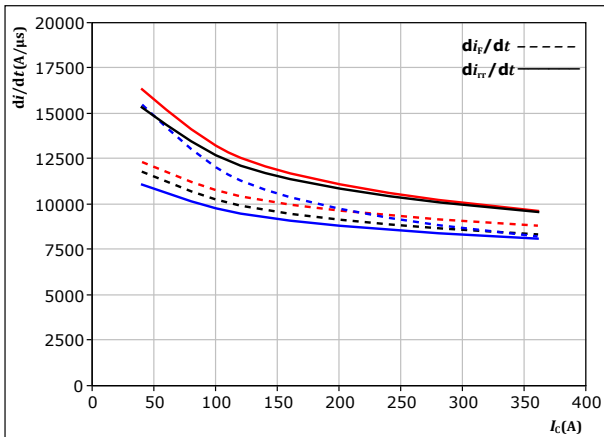
With an inductive load at				25 °C
V_{CE} =	700	V	T_j:	125 °C
V_{GE} =	±15	V		150 °C
R_{gon} =	2	Ω		

figure 39.   **FWD**

Typical rate of fall of forward and reverse recovery current as a function of turn on gate resistor

di_F/dt, di_{rr}/dt = f(R_{gon})
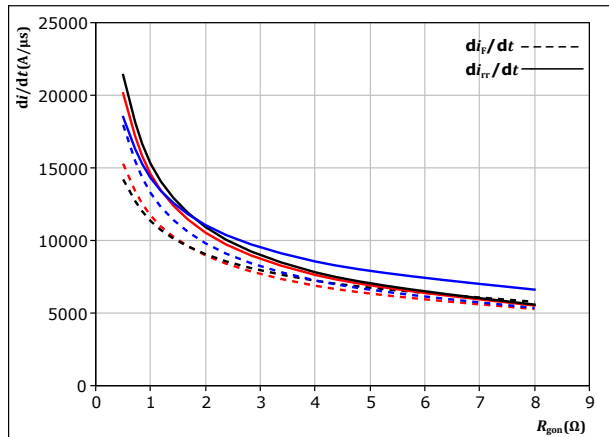
With an inductive load at				25 °C
V_{CE} =	700	V	T_j:	125 °C
V_{GE} =	±15	V		150 °C
I_C =	200	A		

figure 40.   **IGBT**

Reverse bias safe operating area

I_C = f(V_{CE})
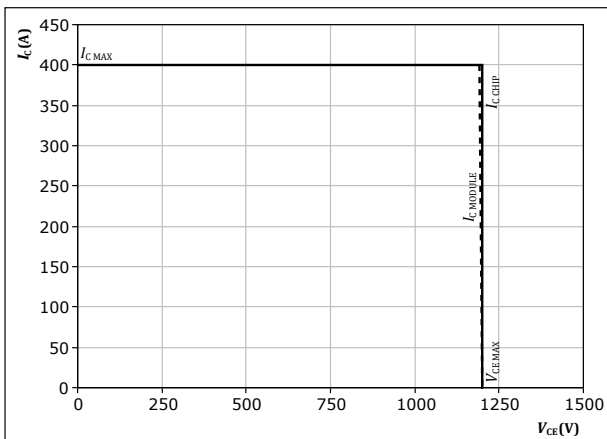
At	T_j =	150	°C
	R_{gon} =	2	Ω
	R_{goff} =	2	Ω

Outer Boost Switching Characteristics

figure 41. **IGBT**

Typical switching energy losses as a function of collector current

$E = f(I_C)$
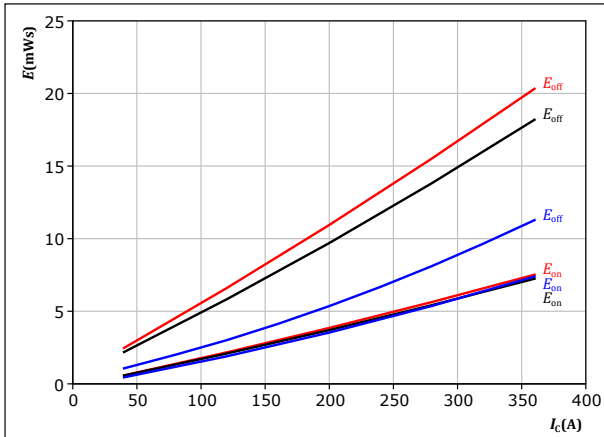
With an inductive load at

V_{CE} =	700	V
V_{GE} =	±15	V
R_{gon} =	2	Ω
R_{goff} =	2	Ω

T_j: 25 °C / 125 °C / 150 °C

figure 42. **IGBT**

Typical switching energy losses as a function of IGBT turn on gate resistor

$E = f(R_g)$
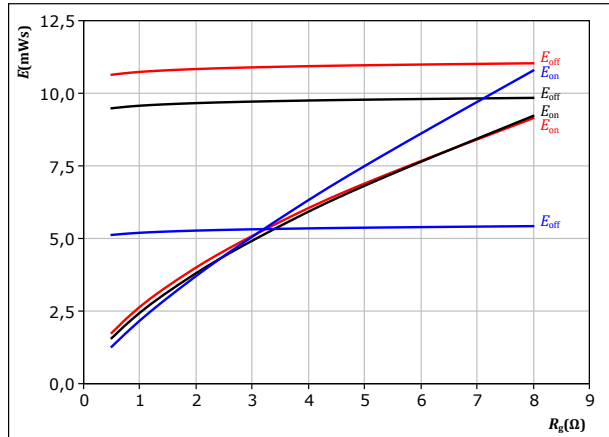
With an inductive load at

V_{CE} =	700	V
V_{GE} =	±15	V
I_C =	200	A

T_j: 25 °C / 125 °C / 150 °C

figure 43. **FWD**

Typical reverse recovered energy loss as a function of collector current

$E_{rec} = f(I_C)$
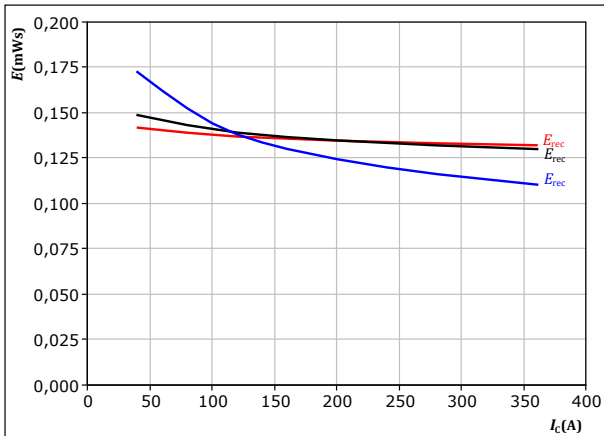
With an inductive load at

V_{CE} =	700	V
V_{GE} =	±15	V
R_{gon} =	2	Ω

T_j: 25 °C / 125 °C / 150 °C

figure 44. **FWD**

Typical reverse recovered energy loss as a function of IGBT turn on gate resistor

$E_{rec} = f(R_g)$
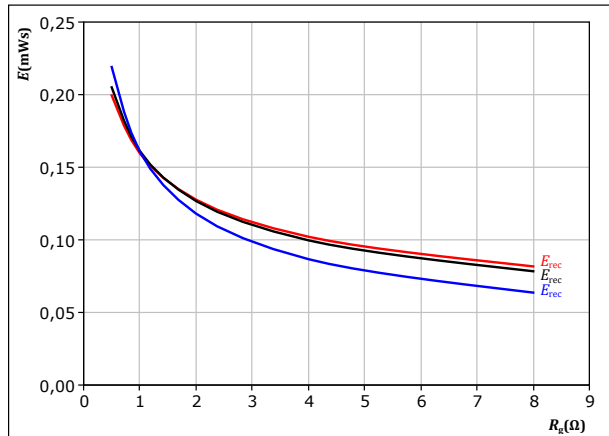
With an inductive load at

V_{CE} =	700	V
V_{GE} =	±15	V
I_C =	200	A

T_j: 25 °C / 125 °C / 150 °C

Outer Boost Switching Characteristics

figure 45. **IGBT**

Typical switching times as a function of collector current

$t = f(I_c)$
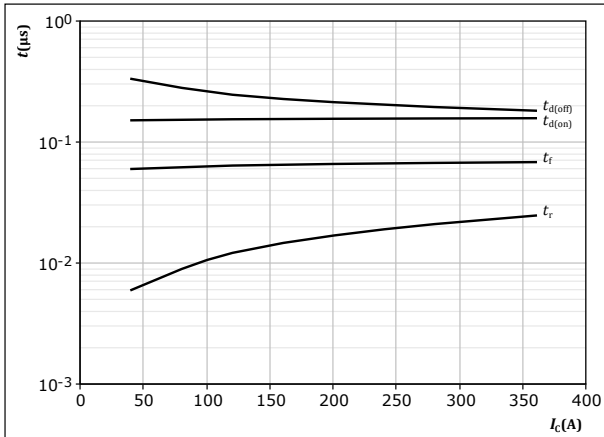
With an inductive load at

T_j =	150	°C
V_{CE} =	700	V
V_{GE} =	±15	V
R_{gon} =	2	Ω
R_{goff} =	2	Ω

figure 46. **IGBT**

Typical switching times as a function of IGBT turn on gate resistor

$t = f(R_g)$
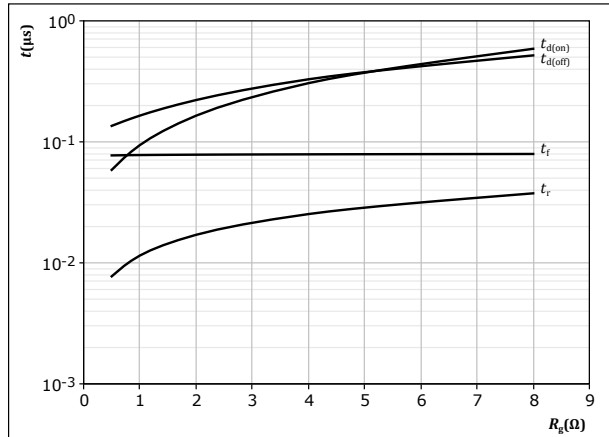
With an inductive load at

T_j =	150	°C
V_{CE} =	700	V
V_{GE} =	±15	V
I_C =	200	A

figure 47. **FWD**

Typical reverse recovery time as a function of collector current

$t_{rr} = f(I_c)$
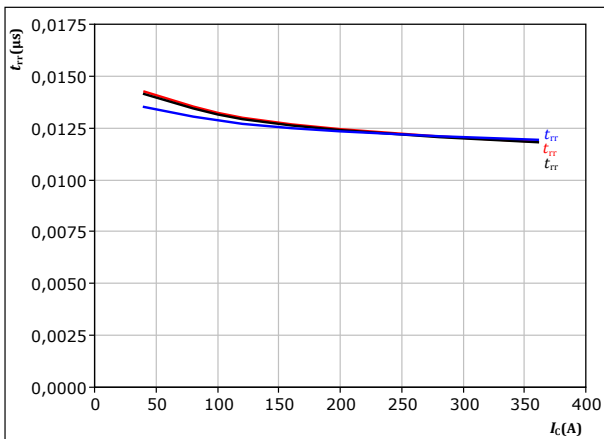
With an inductive load at

V_{CE} =	700	V
V_{GE} =	±15	V
R_{gon} =	2	Ω

T_j: — 25 °C — 125 °C — 150 °C

figure 48. **FWD**

Typical reverse recovery time as a function of IGBT turn on gate resistor
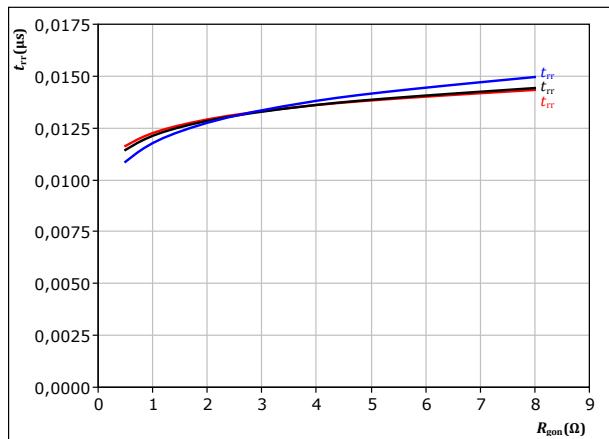
$t_{rr} = f(R_{gon})$

With an inductive load at

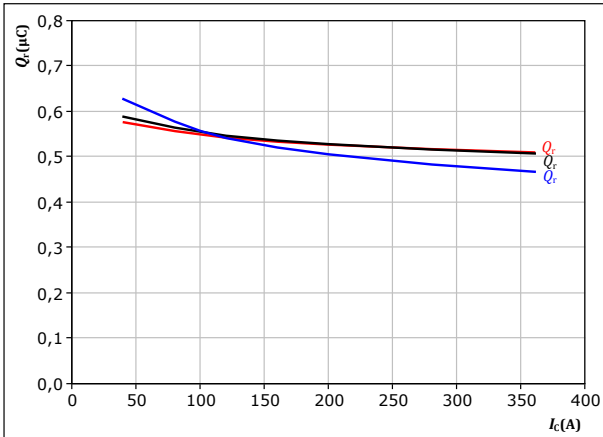|		
V_{CE} =	700	V
V_{GE} =	±15	V
I_C =	200	A

T_j: — 25 °C — 125 °C — 150 °C

Outer Boost Switching Characteristics

figure 49.   **FWD**

Typical recovered charge as a function of collector current

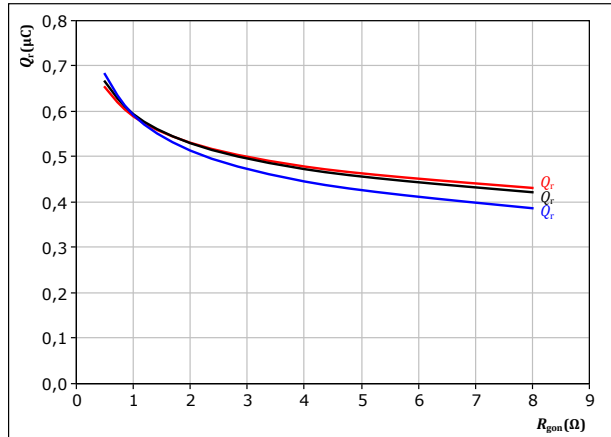$Q_r = f(I_C)$

With an inductive load at

V_{CE} =	700	V	
V_{GE} =	±15	V	
R_{gon} =	2	Ω	

T_j: 25 °C (blue), 125 °C (black), 150 °C (red)

figure 50.   **FWD**

Typical recovered charge as a function of IGBT turn on gate resistor

$Q_r = f(R_{gon})$
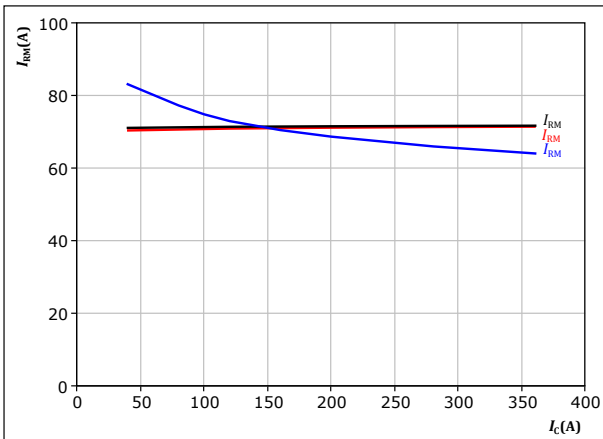

With an inductive load at

V_{CE} =	700	V	
V_{GE} =	±15	V	
I_C =	200	A	

T_j: 25 °C (blue), 125 °C (black), 150 °C (red)

figure 51.   **FWD**

Typical peak reverse recovery current as a function of collector current
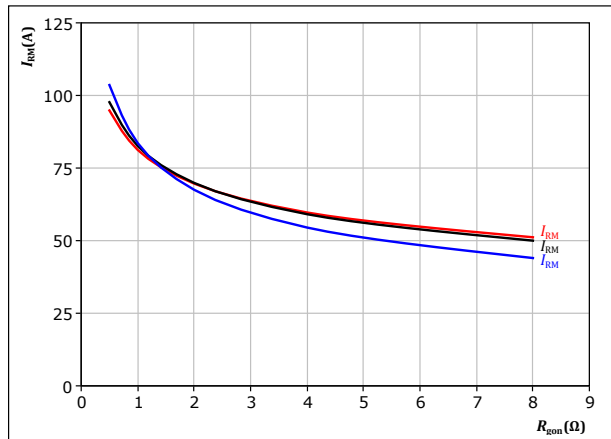
$I_{RM} = f(I_C)$

With an inductive load at

V_{CE} =	700	V	
V_{GE} =	±15	V	
R_{gon} =	2	Ω	

T_j: 25 °C (blue), 125 °C (black), 150 °C (red)

figure 52.   **FWD**

Typical peak reverse recovery current as a function of IGBT turn on gate resistor

$I_{RM} = f(R_{gon})$

With an inductive load at

V_{CE} =	700	V	
V_{GE} =	±15	V	
I_C =	200	A	

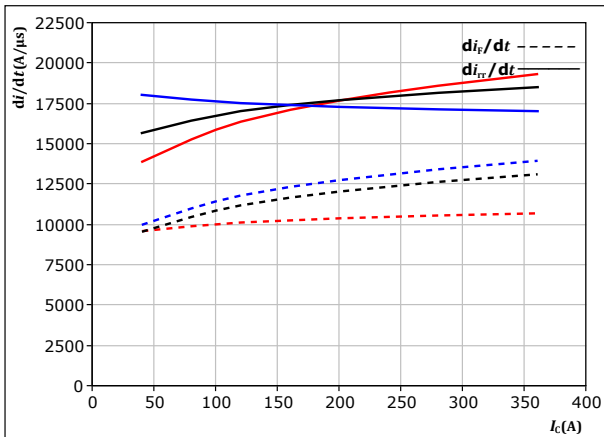T_j: 25 °C (blue), 125 °C (black), 150 °C (red)

Outer Boost Switching Characteristics

figure 53. FWD

Typical rate of fall of forward and reverse recovery current as a function of collector current
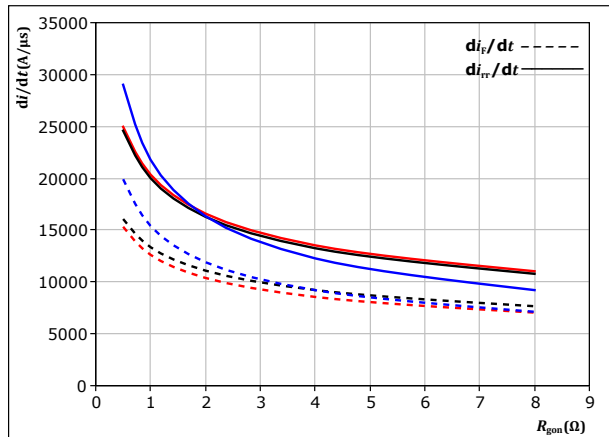di_F/dt, di_{rr}/dt = f(I_C)

di_F/dt ----
di_{rr}/dt ——

With an inductive load at

V_{CE} =	700	V		25 °C
V_{GE} =	±15	V	T_j:	125 °C
R_{gon} =	2	Ω		150 °C

figure 54. FWD

Typical rate of fall of forward and reverse recovery current as a function of turn on gate resistor
di_F/dt, di_{rr}/dt = f(R_{gon})

di_F/dt ----
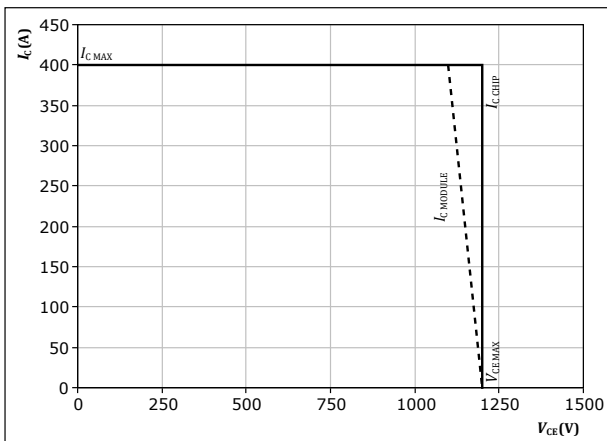di_{rr}/dt ——

With an inductive load at

V_{CE} =	700	V		25 °C
V_{GE} =	±15	V	T_j:	125 °C
I_C =	200	A		150 °C

figure 55. IGBT

Reverse bias safe operating area
I_C = f(V_{CE})

At

T_j =	150	°C
R_{gon} =	2	Ω
R_{goff} =	2	Ω

Switching Definitions

figure 56. **IGBT**

Turn-off Switching Waveforms & definition of t_{doff}, t_{Eoff} (t_{tEoff} = integrating time for E_{off})
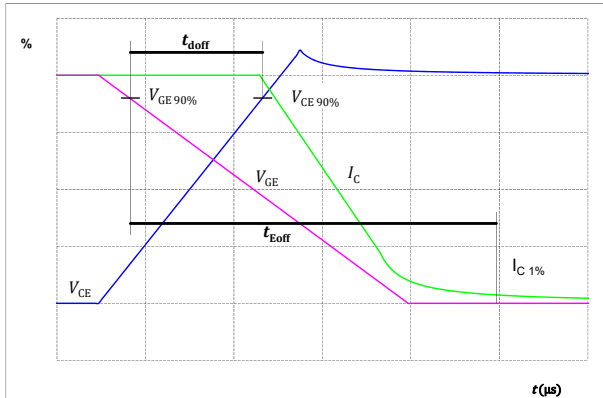

figure 57. **IGBT**

Turn-on Switching Waveforms & definition of t_{don}, t_{Eon} (t_{Eon} = integrating time for E_{on})
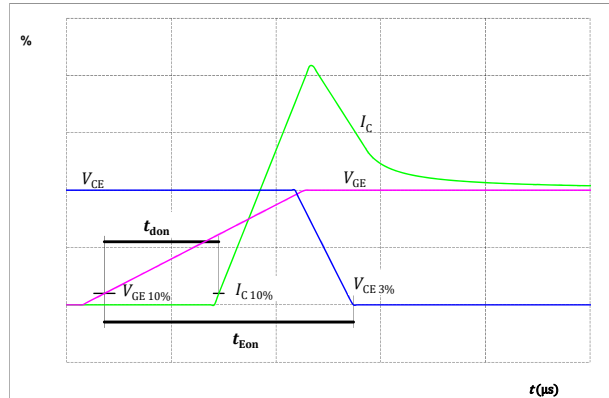

figure 58. **IGBT**

Turn-off Switching Waveforms & definition of t_f

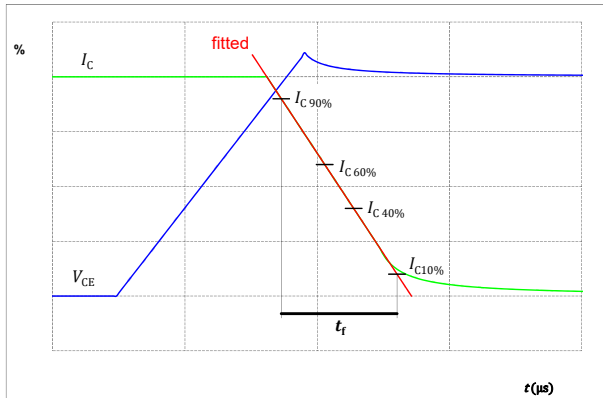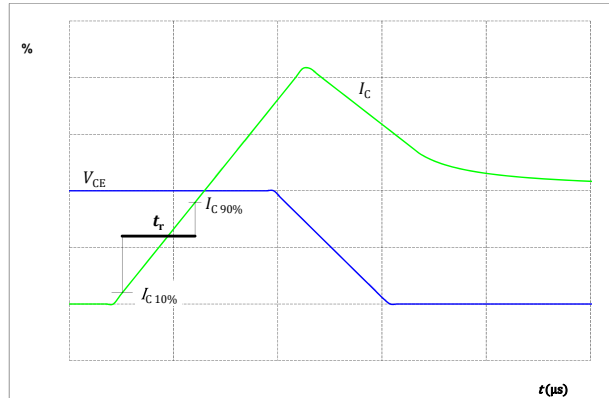**figure 59.** **IGBT**

Turn-on Switching Waveforms & definition of t_r

Switching Definitions

<table>
<tr><td>figure 60.</td><td>FWD</td></tr>
</table>

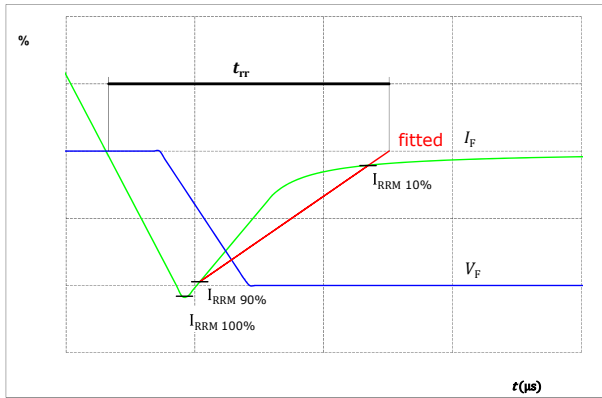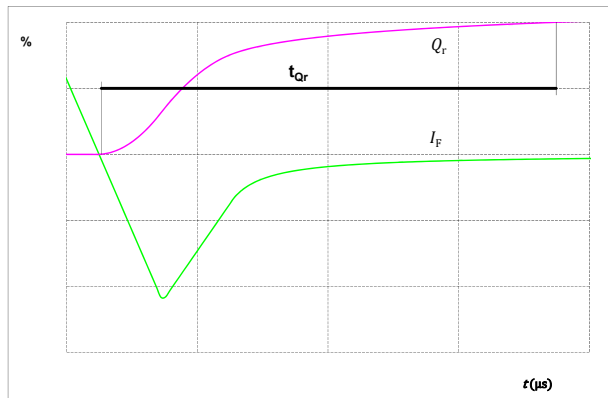**Turn-off Switching Waveforms & definition of** t_{rr}

<table>
<tr><td>figure 61.</td><td>FWD</td></tr>
</table>

Turn-on Switching Waveforms & definition of t_{Qr} (t_{Qr} = integrating time for Q_r)
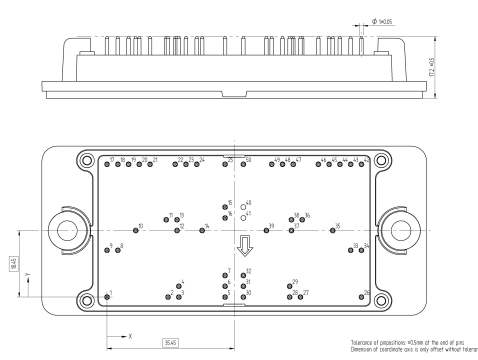
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Ordering Code

Version	Ordering Code
Without thermal paste	30-FT12B2A200H706-PK49L01
With thermal paste (3,4 W/mK, PSX-P7)	30-FT12B2A200H706-PK49L01-/3/

Marking

		Name		Date code	UL & VIN	Lot	Serial
	Text	NN-NNNNNNNNNNNNNN-TTTTTTVV		WWYY	UL VIN	LLLLL	SSSS
	Datamatrix	**Type&Ver**	**Lot number**	**Serial**	**Date code**		
		TTTTTTVV	LLLLL	SSSS	WWYY		

Outline

Pin	X	Y	Function				
				26	70,9	0	C22
1	0	0	C12	27	53,9	0	DC-Boost2
2	17	0	DC-Boost1	28	50,9	0	DC-Boost2
3	20	0	DC-Boost1	29	50,9	3	DC-Boost2
4	20	3	DC-Boost1	30	38	0	DC+Boost2
5	32,9	0	DC+Boost1	31	38	3	DC+Boost2
6	32,9	3	DC+Boost1	32	38	6	DC+Boost2
7	32,9	6	DC+Boost1	33	67,9	13	G27
8	3	13	G17	34	70,9	13	S27
9	0	13	S17	35	62,9	18,5	FC22
10	8	18,5	FC12	36	54,4	21,5	Boost2
11	16,5	21,5	Boost1	37	51,4	18,5	Boost2
12	19,5	18,5	Boost1	38	51,4	21,5	Boost2
13	19,5	21,5	Boost1	39	44,4	18,5	FC21
14	26,5	18,5	FC11	40	not assembled		
15	32,9	25	Therm11	41	not assembled		
16	32,9	22	Therm12	42	70,9	36,9	G25
17	0	36,9	G15	43	67,9	36,9	S25
18	3	36,9	S15	44	64,9	36,9	FC22
19	6	36,9	FC12	45	61,9	36,9	FC22
20	9	36,9	FC12	46	58,9	36,9	FC22
21	12	36,9	FC12	47	51,9	36,9	FC21
22	19	36,9	FC11	48	48,9	36,9	FC21
23	22	36,9	FC11	49	45,9	36,9	FC21
24	25	36,9	FC11	50	38	36,9	C21
25	32,9	36,9	C11				

Pinout
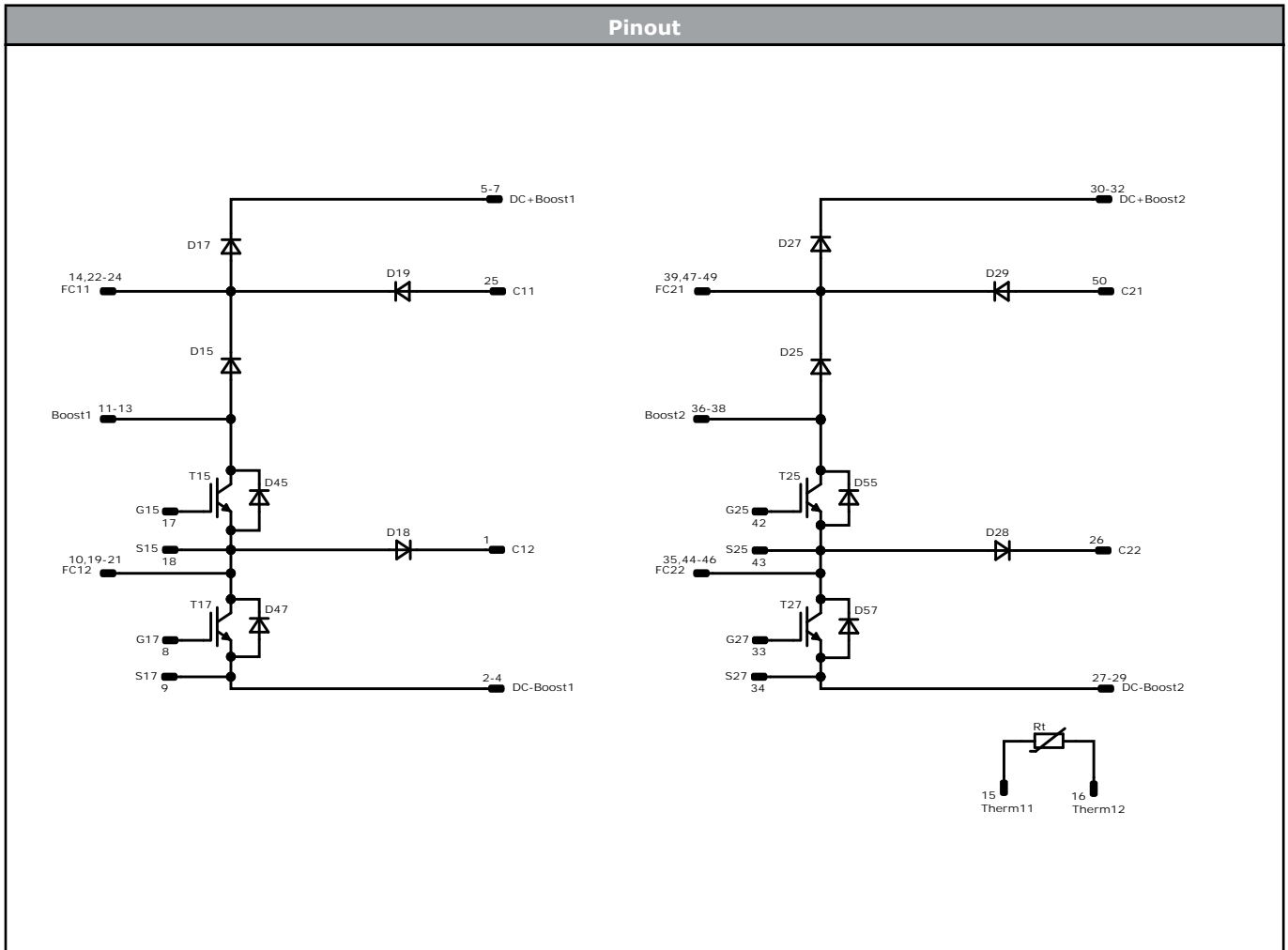
Identification					
ID	**Component**	**Voltage**	**Current**	**Function**	**Comment**
T15, T25	IGBT	1200 V	200 A	Inner Boost Switch	
D15, D25	FWD	1200 V	80 A	Inner Boost Diode	
D45, D55	Rectifier	1600 V	40 A	Inner Boost Sw. Protection Diode	
T17, T27	IGBT	1200 V	200 A	Outer Boost Switch	
D17, D27	FWD	1200 V	80 A	Outer Boost Diode	
D47, D57	Rectifier	1600 V	40 A	Outer Boost Sw. Protection Diode	
D19, D29	FWD	1200 V	75 A	Aux Diode H	
D18, D28	FWD	1200 V	75 A	Aux Diode L	
Rt	Thermistor			Thermistor	

Vincotech

Packaging instruction				
Standard packaging quantity (SPQ) 36	>SPQ	Standard	<SPQ	Sample

Handling instruction
Handling instructions for *flow* 2 packages see vincotech.com website.

Package data
Package data for *flow* 2 packages see vincotech.com website.

Vincotech thermistor reference
See Vincotech thermistor reference table at vincotech.com website.

UL recognition and file number	
This device is UL 1557 recognized under E192116 up to a junction temperature under switching condition $T_{j,op}$=175°C and up to 4000VAC/1min isolation voltage. For more information see vincotech.com website.	®UL

Document No.:	**Date:**	**Modification:**	**Pages**
30-FT12B2A200H706-PK49L01-D1-14	23 Aug. 2024		

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2. A critical component is any component of a life support device or system whose failure to perform can be reasonably expected to cause the failure of the life support device or system, or to affect its safety or effectiveness.