Vincotech

10-EZ126TA025SC-L858F43T
datasheet

*flow*PACK E1	1200 V / 25 A

Topology features

- Inverter
- Kelvin Emitter for improved switching performance
- Tandem inverter diode
- Temperature sensor

Component features

- Easy paralleling
- Low turn-off losses
- Low collector emitter saturation voltage
- Positive temperature coefficient
- Short tail current

Housing features

- Base isolation: Al_2O_3
- Convex shaped substrate for superior thermal contact
- Compact housing
- CTI600 housing material
- Thermo-mechanical push-and-pull force relief
- Press-fit pin
- Reliable cold welding connection

Target applications
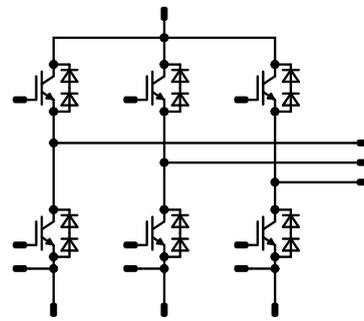
- Embedded Drives
- Servo Drives

Types

- 10-EZ126TA025SC-L858F43T

flow E1 12 mm housing

Schematic

Maximum Ratings

T_j = 25 °C, unless otherwise specified

Parameter	Symbol	Conditions		Value	Unit
Inverter Switch					
Collector-emitter voltage	V_{CES}			1200	V
Collector current (DC current)	I_C	$T_j = T_{jmax}$	T_s = 80 °C	34	A
Repetitive peak collector current	I_{CRM}	t_p limited by T_{jmax}		75	A
Total power dissipation	P_{tot}	$T_j = T_{jmax}$	T_s = 80 °C	96	W
Gate-emitter voltage	V_{GES}			±20	V
Short circuit ratings	t_{SC}	V_{GE} = 15 V, V_{CC} = 800 V	T_j = 150 °C	10	µs
Maximum junction temperature	T_{jmax}			175	°C
Inverter Diode					
Peak repetitive reverse voltage	V_{RRM}			1300	V
Forward current (DC current)	I_F	$T_j = T_{jmax}$	T_s = 80 °C	28	A
Repetitive peak forward current	I_{FRM}	t_p limited by T_{jmax}		60	A
Total power dissipation	P_{tot}	$T_j = T_{jmax}$	T_s = 80 °C	86	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
Isolation voltage	V_{isol}	AC Voltage	t_p = 1 min	2500	V
Creepage distance				>12,7	mm
Clearance				8,62	mm
Comparative Tracking Index	CTI			≥ 600	

*100 % tested in production

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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	

Inverter Switch

Static

Gate-emitter threshold voltage	$V_{GE(th)}$	$V_{CE} = V_{GE}$		0,00085	25	5,3	5,8	6,3	V
Collector-emitter saturation voltage	V_{CEsat}	15		25	25 125 150	1,58	1,83 2,12 2,18	2,07[1]	V
Collector-emitter cut-off current	I_{CES}	0	1200		25			2,4	µA
Gate-emitter leakage current	I_{GES}	20	0		25			120	nA
Internal gate resistance	r_g						None		Ω
Input capacitance	C_{ies}	f = 1 Mhz	0	25		25		1450		pF
Reverse transfer capacitance	C_{res}						50		pF
Gate charge	Q_g	±15		0	25		200		nC

Thermal

Thermal resistance junction to sink [2]	$R_{th(j-s)}$	λ_{paste} = 3,4 W/mK (PSX)					0,99		K/W

Dynamic

Turn-on delay time	$t_{d(on)}$	R_{gon} = 12,8 Ω R_{goff} = 12,8 Ω			25 125 150		67,84 67,84 67,68		ns
Rise time	t_r				25 125 150		22,56 24,16 24,64		ns
Turn-off delay time	$t_{d(off)}$		±15	600	25 25 125 150		174,4 227,52 242,08		ns
Fall time	t_f				25 125 150		136,42 175,02 203,55		ns
Turn-on energy (per pulse)	E_{on}	Q_{rFWD}=0,878 µC Q_{rFWD}=1,7 µC Q_{rFWD}=2,06 µC			25 125 150		0,958 1,39 1,52		mWs
Turn-off energy (per pulse)	E_{off}				25 125 150		1,51 2,4 2,7		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	
Inverter Diode										
Static										
Forward voltage	V_{F}				30	25 125 150	2,46	3,4 3,18 3,1	3,74[1]	V
Reverse leakage current	I_{R}	V_{r} = 1300 V				25			0,36	µA
Thermal										
Thermal resistance junction to sink [2]	$R_{th(j-s)}$	λ_{paste} = 3,4 W/mK (PSX)						1,11		K/W
Dynamic										
Peak recovery current	I_{RRM}					25 125 150		11,4 14,02 15,02		A
Reverse recovery time	t_{rr}					25 125 150		206,56 290,78 327,56		ns
Recovered charge	Q_{r}	di/dt=794 A/µs di/dt=808 A/µs di/dt=783 A/µs	±15	600	25	25 125 150		0,878 1,7 2,06		µC
Reverse recovered energy	E_{rec}					25 125 150		0,371 0,703 0,859		mWs
Peak rate of fall of recovery current	$(di_{rr}/dt)_{max}$					25 125 150		667,57 66,42 63,82		A/µs

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	

Thermistor

Static

Parameter	Symbol	Conditions					Min	Typ	Max	Unit
Rated resistance	R					25		5		kΩ
Deviation of R_{100}	$\Delta_{R/R}$	R_{100} = 493 Ω				100	-5		5	%
Power dissipation	P							245		mW
Power dissipation constant	d					25		1,4		mW/K
B-value	$B_{(25/50)}$	Tol. ±2 %						3375		K
B-value	$B_{(25/100)}$	Tol. ±2 %						3437		K
Vincotech Thermistor Reference									K	

[1] Value at chip level

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

Inverter Switch Characteristics

figure 1.	IGBT

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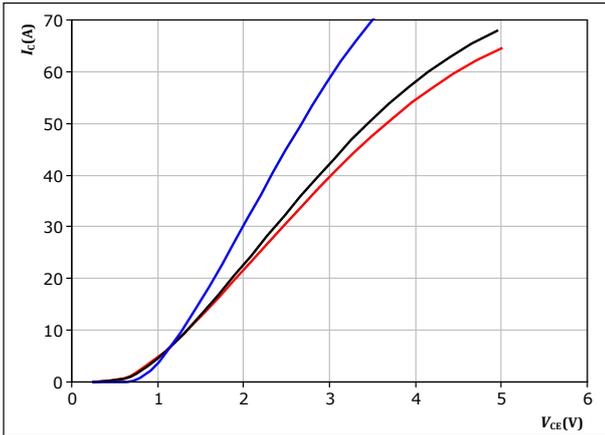
$I_C = f(V_{CE})$

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
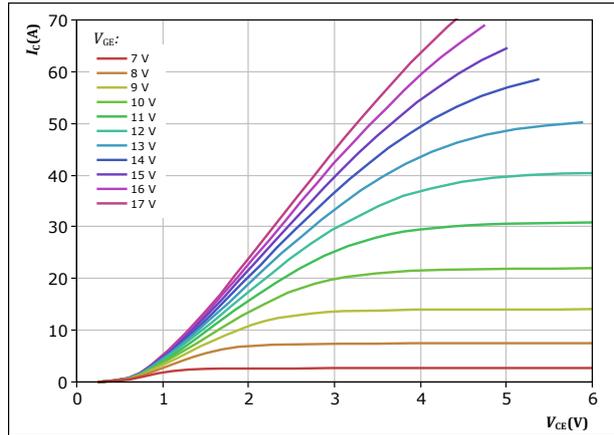
t_p =	250	µs
T_j =	150	°C

V_{GE} from 7 V to 17 V in steps of 1 V

figure 3.	IGBT

Typical transfer characteristics

$I_C = f(V_{GE})$
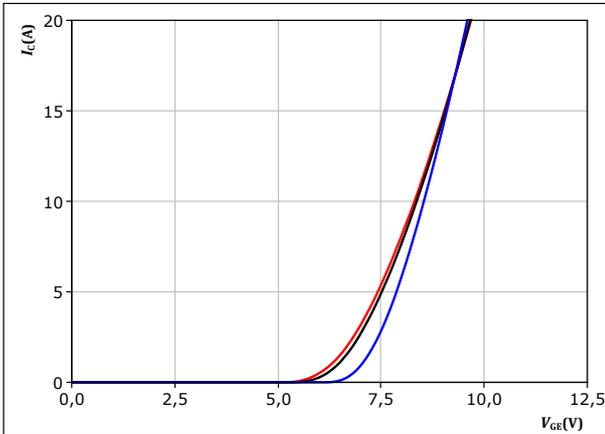
t_p =	250	µs		**25 °C**
V_{CE} =	10	V	T_j:	**125 °C**
				150 °C

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
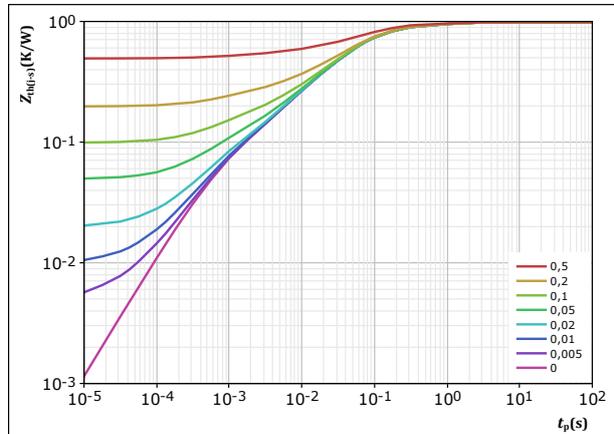
D =	t_p / T	
$R_{th(j-s)}$ =	0,987	K/W

IGBT thermal model values

R (K/W)	τ (s)
1,10E-01	8,55E-01
4,47E-01	8,90E-02
2,86E-01	2,76E-02
8,93E-02	5,06E-03
5,44E-02	6,62E-04

Inverter Switch Characteristics

figure 5.	IGBT

Safe operating area

$I_C = f(V_{CE})$
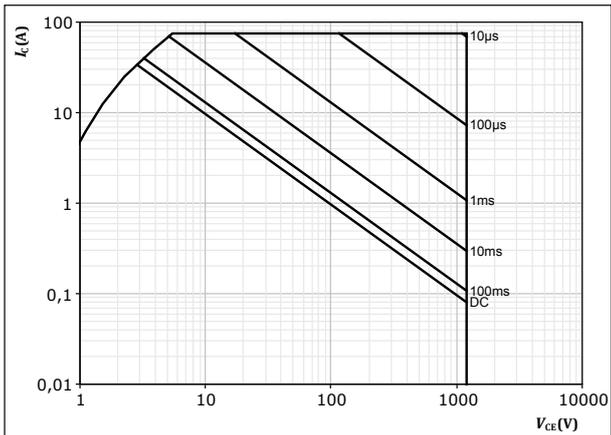
D = single pulse
T_s = 80 °C
V_{GE} = 15 V
T_j = T_{jmax}

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Inverter Diode Characteristics

figure 6. FWD
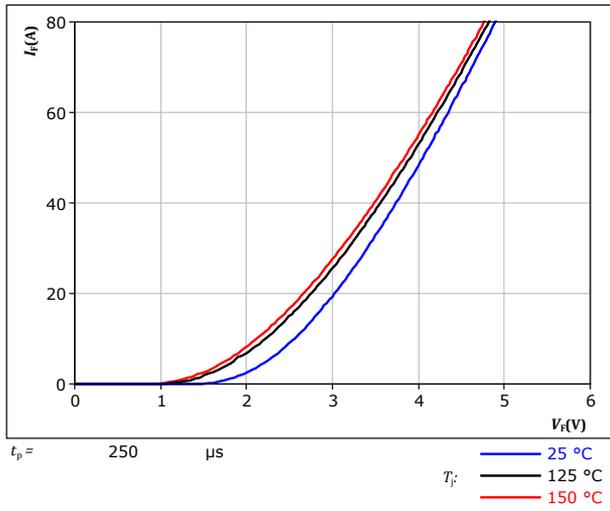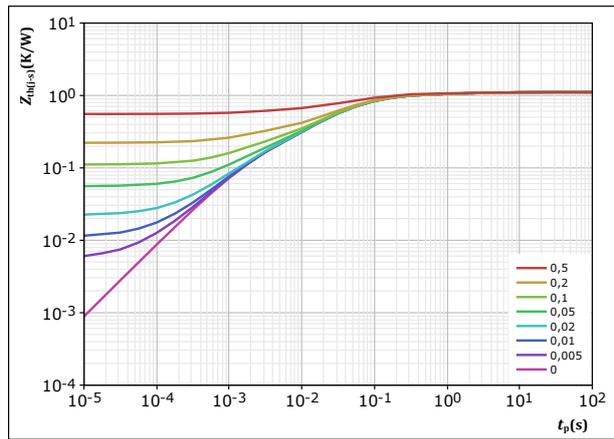**Typical forward characteristics**
$I_F = f(V_F)$

$t_p =$ 250 µs

T_j: 25 °C, 125 °C, 150 °C

figure 7. FWD
Transient thermal impedance as a function of pulse width
$Z_{th(j-s)} = f(t_p)$

$D = t_p / T$
$R_{th(j-s)} =$ 1,11 K/W

FWD thermal model values

R (K/W)	τ (s)
4,60E-02	4,31E+00
9,61E-02	7,11E-01
4,91E-01	7,98E-02
3,68E-01	1,98E-02
1,08E-01	1,69E-03

Thermistor Characteristics

figure 8.	Thermistor

Typical NTC characteristic as function of temperature

$R_T = f(T)$
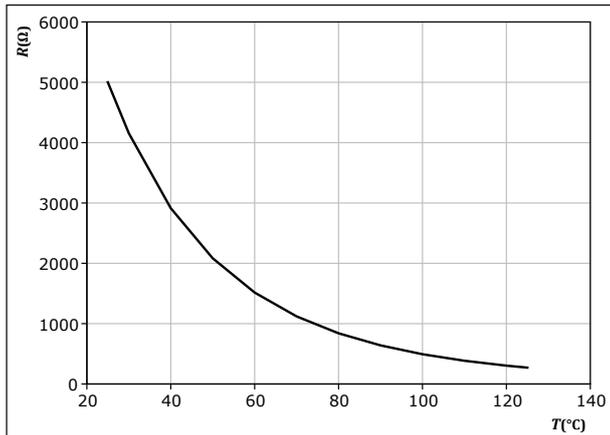
Inverter Switching Characteristics

figure 9.	IGBT

Typical switching energy losses as a function of collector current

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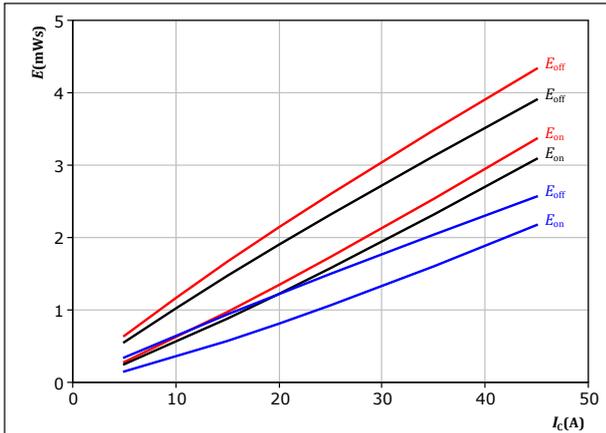
With an inductive load at

				T_j:	25 °C
V_{CE} =	600	V			125 °C
V_{GE} =	±15	V			150 °C
R_{gon} =	12,8	Ω			
R_{goff} =	12,8	Ω			

figure 10.	IGBT

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

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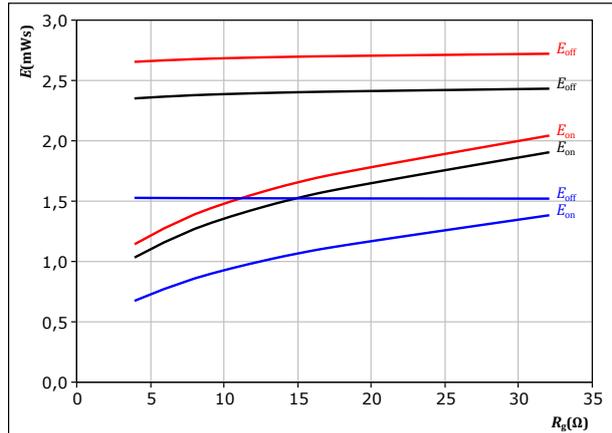
With an inductive load at

				T_j:	25 °C
V_{CE} =	600	V			125 °C
V_{GE} =	±15	V			150 °C
I_C =	25	A			

figure 11.	FWD

Typical reverse recovered energy loss as a function of collector current

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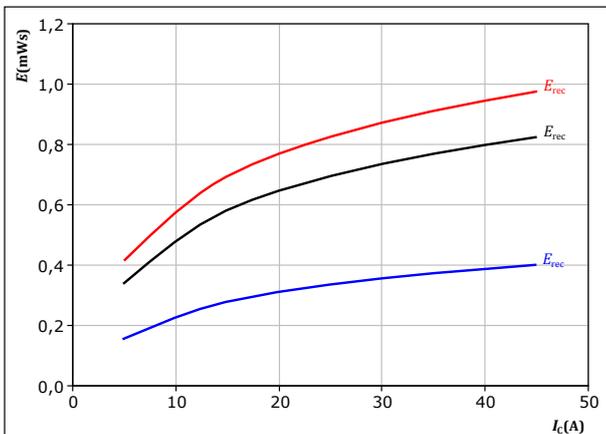
With an inductive load at

				T_j:	25 °C
V_{CE} =	600	V			125 °C
V_{GE} =	±15	V			150 °C
R_{gon} =	12,8	Ω			

figure 12.	FWD

Typical reverse recovered energy loss as a function of IGBT turn on gate resistor
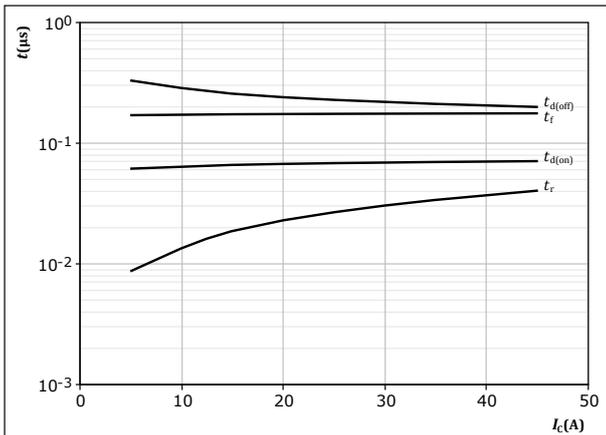
$E_{rec} = f(R_g)$
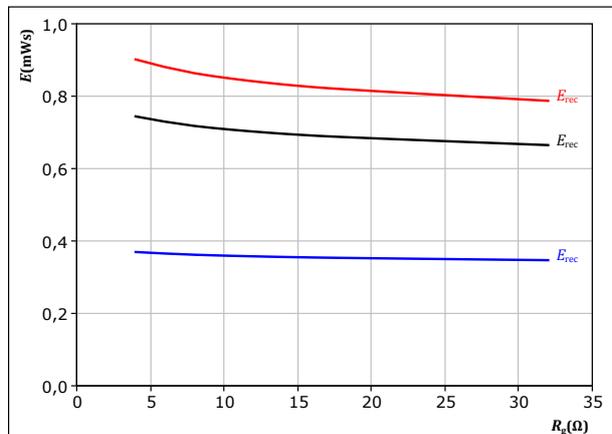
With an inductive load at

				T_j:	25 °C
V_{CE} =	600	V			125 °C
V_{GE} =	±15	V			150 °C
I_C =	25	A			

Inverter Switching Characteristics

figure 13.	IGBT

Typical switching times as a function of collector current

$t = f(I_C)$

With an inductive load at

$T_j =$	150	°C
$V_{CE} =$	600	V
$V_{GE} =$	±15	V
$R_{gon} =$	12,8	Ω
$R_{goff} =$	12,8	Ω

figure 14.	IGBT

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

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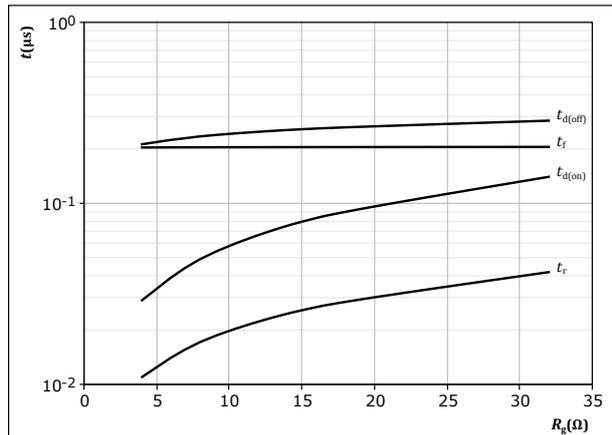
With an inductive load at

$T_j =$	150	°C
$V_{CE} =$	600	V
$V_{GE} =$	±15	V
$I_C =$	25	A

figure 15.	FWD

Typical reverse recovery time as a function of collector current

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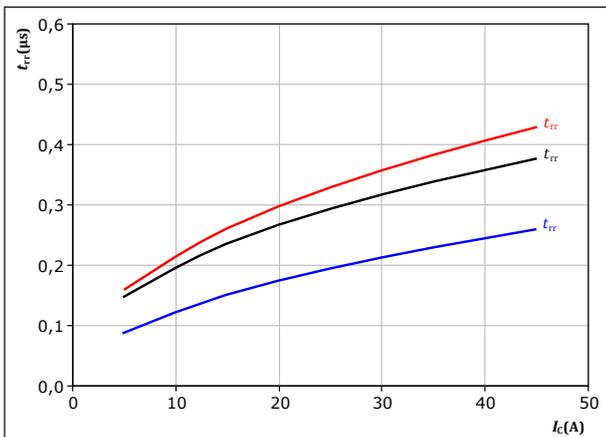
With an inductive load at

$V_{CE} =$	600	V
$V_{GE} =$	±15	V
$R_{gon} =$	12,8	Ω

T_j:
— 25 °C
— 125 °C
— 150 °C

figure 16.	FWD

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

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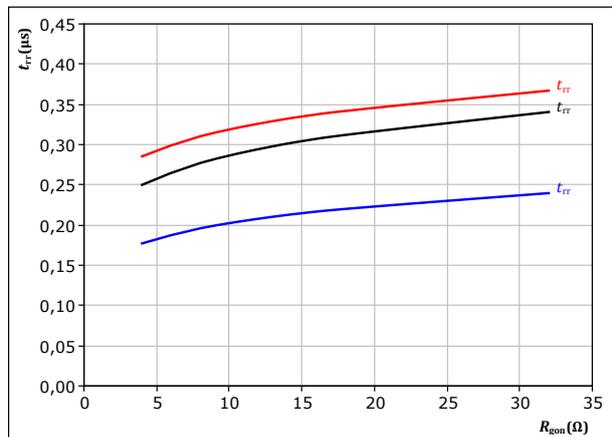
With an inductive load at

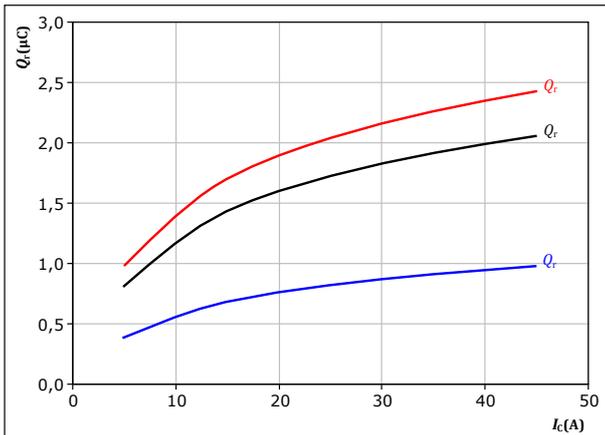|		
$V_{CE} =$	600	V
$V_{GE} =$	±15	V
$I_C =$	25	A

T_j:
— 25 °C
— 125 °C
— 150 °C

Inverter Switching Characteristics

figure 17.	FWD

Typical recovered charge as a function of collector current
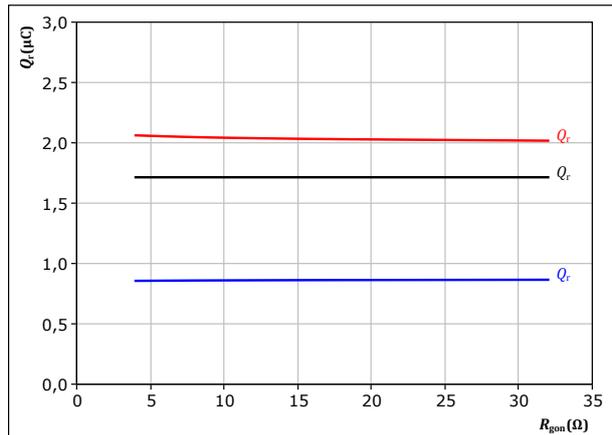
$Q_r = f(I_C)$

With an inductive load at

$V_{CE} =$	600	V
$V_{GE} =$	±15	V
$R_{gon} =$	12,8	Ω

T_j: — 25 °C — 125 °C — 150 °C

figure 18.	FWD

Typical recovered charge as a function of IGBT turn on gate resistor
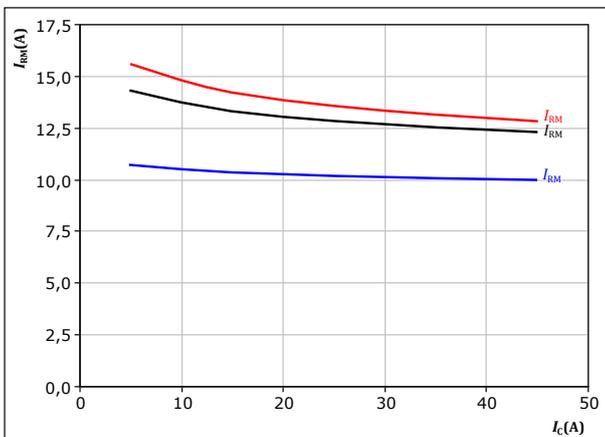
$Q_r = f(R_{gon})$

With an inductive load at

$V_{CE} =$	600	V
$V_{GE} =$	±15	V
$I_C =$	25	A

T_j: — 25 °C — 125 °C — 150 °C

figure 19.	FWD

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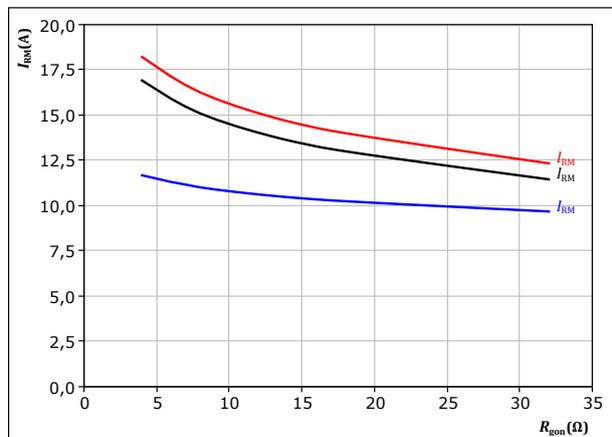
$I_{RM} = f(I_C)$

With an inductive load at

$V_{CE} =$	600	V
$V_{GE} =$	±15	V
$R_{gon} =$	12,8	Ω

T_j: — 25 °C — 125 °C — 150 °C

figure 20.	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

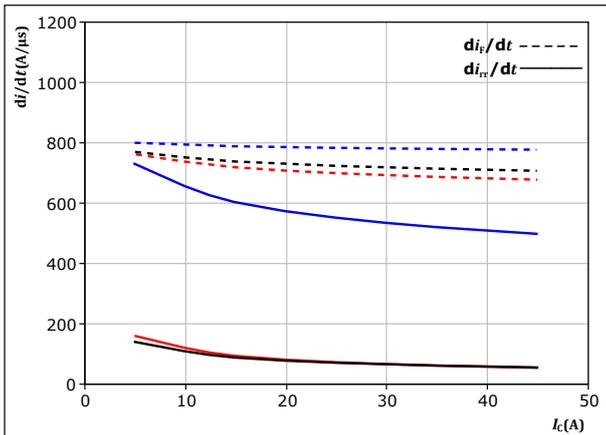|		
$V_{CE} =$	600	V
$V_{GE} =$	±15	V
$I_C =$	25	A

T_j: — 25 °C — 125 °C — 150 °C

Inverter Switching Characteristics

figure 21. FWD

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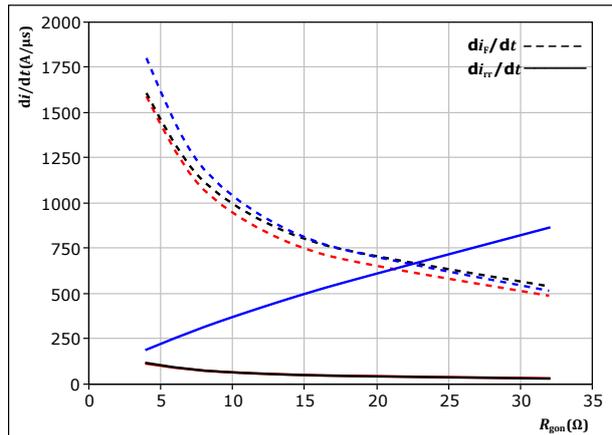
di_F/dt, di_{rr}/dt = f(I_C)

With an inductive load at

				T_j:	25 °C
V_{CE} =	600	V			125 °C
V_{GE} =	±15	V			150 °C
R_{gon} =	12,8	Ω			

figure 22. 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

				T_j:	25 °C
V_{CE} =	600	V			125 °C
V_{GE} =	±15	V			150 °C
I_C =	25	A			

figure 23. IGBT

Reverse bias safe operating area

I_C = f(V_{CE})
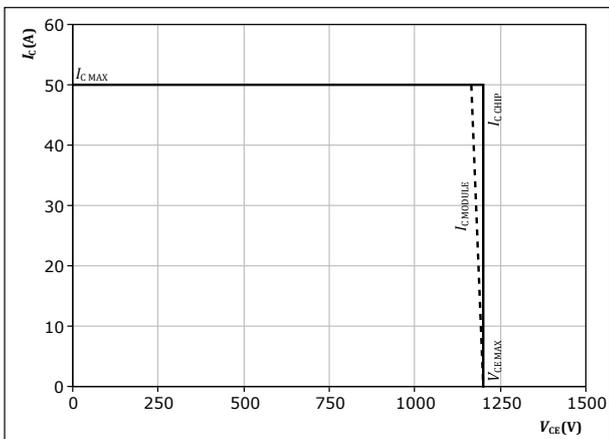
At

	T_j =	150	°C
	R_{gon} =	12,8	Ω
	R_{goff} =	12,8	Ω

Inverter Switching Definitions

figure 24.	IGBT

Turn-off Switching Waveforms & definition of t_{doff}, t_{Eoff} (t_{tEoff} = integrating time for E_{off})
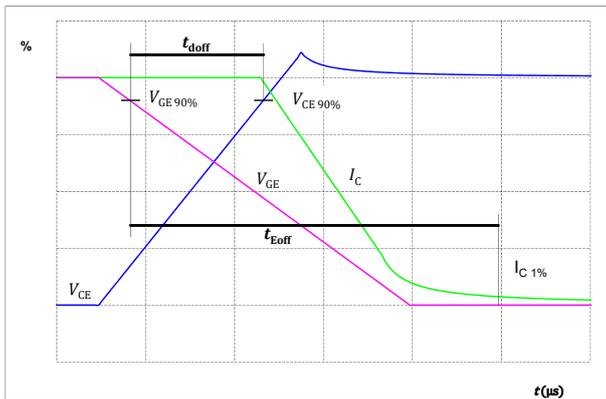
figure 25.	IGBT

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

figure 26.	IGBT

Turn-off Switching Waveforms & definition of t_f

figure 27.	IGBT

Turn-on Switching Waveforms & definition of t_r

Inverter Switching Definitions

figure 28. **FWD**

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

figure 29. **FWD**

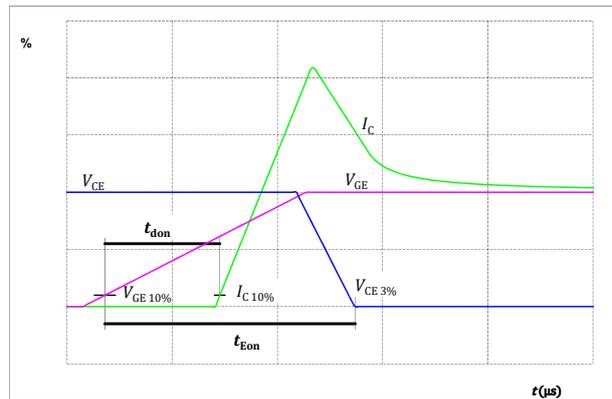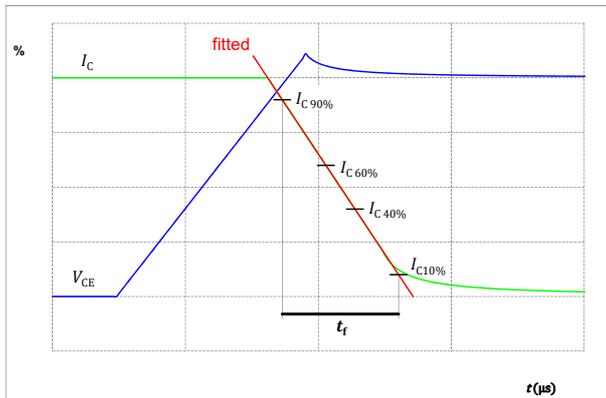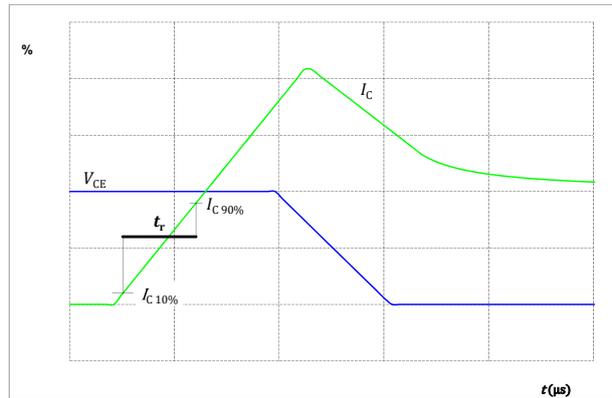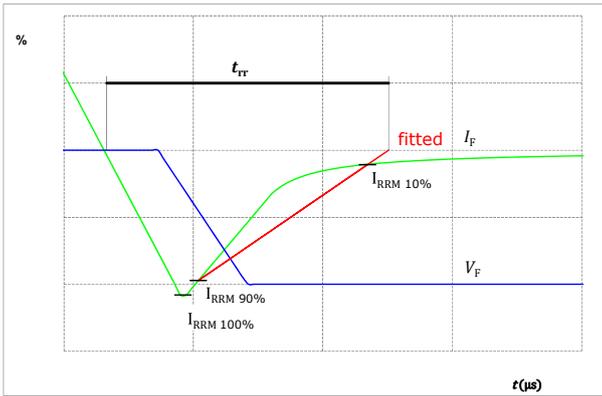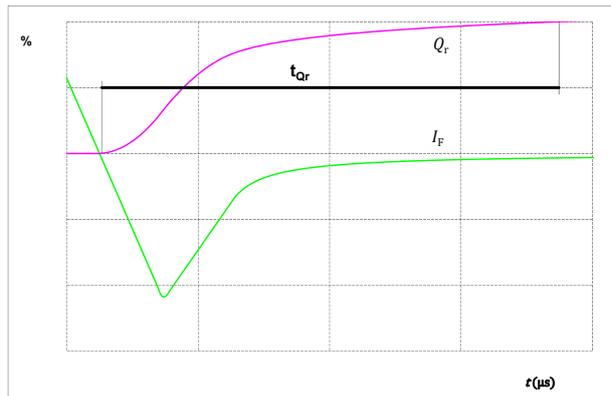**Turn-on Switching Waveforms & definition of** t_{Qr} **(** t_{Qr} **= integrating time for** Q_r **)**

Ordering Code	
Version	**Ordering Code**
Without thermal paste	10-EZ126TA025SC-L858F43T
With thermal paste (3,4 W/mK, PSX-P7)	10-EZ126TA025SC-L858F43T-/3/

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

Outline	

Pin table [mm]			
Pin	X	Y	Function
1	12,8	9,6	DC+
2	16	9,6	DC+
3	22,4	9,6	Therm1
4	25,6	9,6	Therm2
5	32	9,6	DC-2
6	32	6,4	S13
7	32	3,2	DC-1
8	32	0	S11
9	28,8	0	G11
10	6,4	0	Ph1
11	3,2	0	Ph1
12	0	0	G12
13	0	6,4	G14
14	0	16	Ph2
15	0	19,2	Ph2
16	0	25,6	G16
17	3,2	25,6	Ph3
18	6,4	25,6	Ph3
19	28,8	25,6	G15
20	32	25,6	S15
21	32	22,4	DC-3
22	32	16	G13

center of press-fit pinhead
for connection parameter see the handling instruction

Tolerance of pinpositions ±0.4mm at the end of pins
Dimension of coordinate axis is only offset without tolerance

Vincotech

Pinout

Identification

ID	Component	Voltage	Current	Function	Comment
T11, T12, T13, T14, T15, T16	IGBT	1200 V	25 A	Inverter Switch	
D11, D12, D13, D14, D15, D16	FWD	1300 V	30 A	Inverter Diode	
Rt	NTC			Thermistor	

Packaging instruction				
Standard packaging quantity (SPQ) 100	>SPQ	Standard	<SPQ	Sample

Handling instruction
Handling instructions for *flow* E1 packages see vincotech.com website.

Package data
Package data for *flow* E1 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 certified according to UL 1557 standard, UL file number E192116. For more information see vincotech.com website.

Document No.:	Date:	Modification:	Pages
10-EZ126TA025SC-L858F43T-D2-14	1 May. 2022	New Datasheet format, module is unchanged	

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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.