



Vincotech

# 10-PY07NIA150S502-L365F58Y

datasheet

**flowNPC 1**

**1200 V / 150 A**

## Features

- High efficiency
- Low inductive package
- Ultra fast IGBTs
- four-quadrant operation

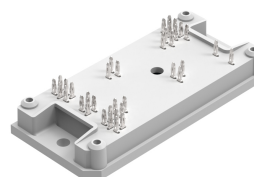
## Target applications

- Solar Inverters
- UPS

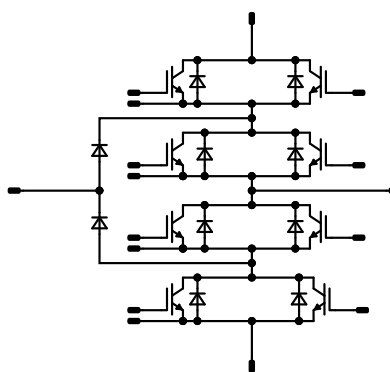
## Types

- 10-PY07NIA150S502-L365F58Y

## flow 1 12 mm housing



## Schematic





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**10-PY07NIA150S502-L365F58Y**  
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## Maximum Ratings

$T_j = 25\text{ °C}$ , unless otherwise specified

Parameter	Symbol	Conditions	Value	Unit
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### Buck Switch

Collector-emitter voltage	$V_{CES}$		650	V
Collector current (DC current)	$I_C$	$T_j = T_{jmax}$ $T_s = 80\text{ °C}$	105	A
Repetitive peak collector current	$I_{CRM}$	$t_p$ limited by $T_{jmax}$	450	A
Total power dissipation	$P_{tot}$	$T_j = T_{jmax}$ $T_s = 80\text{ °C}$	145	W
Gate-emitter voltage	$V_{GES}$		$\pm 20$	V
Maximum junction temperature	$T_{jmax}$		175	°C

### Buck Diode

Peak repetitive reverse voltage	$V_{RRM}$		650	V
Forward current (DC current)	$I_F$	$T_j = T_{jmax}$ $T_s = 80\text{ °C}$	101	A
Repetitive peak forward current	$I_{FRM}$	$t_p$ limited by $T_{jmax}$	300	A
Total power dissipation	$P_{tot}$	$T_j = T_{jmax}$ $T_s = 80\text{ °C}$	127	W
Maximum junction temperature	$T_{jmax}$		175	°C

### Boost Switch

Collector-emitter voltage	$V_{CES}$		650	V
Collector current (DC current)	$I_C$	$T_j = T_{jmax}$ $T_s = 80\text{ °C}$	105	A
Repetitive peak collector current	$I_{CRM}$	$t_p$ limited by $T_{jmax}$	450	A
Total power dissipation	$P_{tot}$	$T_j = T_{jmax}$ $T_s = 80\text{ °C}$	145	W
Gate-emitter voltage	$V_{GES}$		$\pm 20$	V
Maximum junction temperature	$T_{jmax}$		175	°C



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## Maximum Ratings

$T_j = 25\text{ °C}$ , unless otherwise specified

Parameter	Symbol	Conditions	Value	Unit
<b>Boost Diode</b>				
Peak repetitive reverse voltage	$V_{RRM}$		650	V
Forward current (DC current)	$I_F$	$T_j = T_{jmax}$ $T_s = 80\text{ °C}$	101	A
Repetitive peak forward current	$I_{FRM}$	$t_p$ limited by $T_{jmax}$	300	A
Total power dissipation	$P_{tot}$	$T_j = T_{jmax}$ $T_s = 80\text{ °C}$	127	W
Maximum junction temperature	$T_{jmax}$		175	°C

## Boost Sw. Inv. Diode

Peak repetitive reverse voltage	$V_{RRM}$		650	V
Forward current (DC current)	$I_F$	$T_j = T_{jmax}$ $T_s = 80\text{ °C}$	108	A
Repetitive peak forward current	$I_{FRM}$	$t_p$ limited by $T_{jmax}$	300	A
Total power dissipation	$P_{tot}$	$T_j = T_{jmax}$ $T_s = 80\text{ °C}$	149	W
Maximum junction temperature	$T_{jmax}$		175	°C

## Module Properties

### Thermal Properties

Storage temperature	$T_{stg}$		-40...+125	°C
Operation temperature under switching condition	$T_{jop}$		-40...+( $T_{jmax} - 25$ )	°C

### Isolation Properties

Isolation voltage	$V_{isol}$	DC Test Voltage* $t_p = 2\text{ s}$	6000	V
Isolation voltage	$V_{isol}$	AC Voltage $t_p = 1\text{ min}$	2500	V
Creepage distance			>12,7	mm
Clearance			7,86	mm
Comparative Tracking Index	CTI		≥ 200	

\*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	

### Buck Switch

#### Static

Gate-emitter threshold voltage	$V_{GE(th)}$	$V_{CE} = V_{GE}$			0,0015	25	3,2	4	4,8	V
Collector-emitter saturation voltage	$V_{CE(sat)}$		15		150	25 125 150		1,43 1,52 1,55	1,75 <sup>(1)</sup>	V
Collector-emitter cut-off current	$I_{CES}$		0	650		25			100	μA
Gate-emitter leakage current	$I_{GES}$		20	0		25			200	nA
Internal gate resistance	$r_g$							None		Ω
Input capacitance	$C_{ies}$	$f = 1 \text{ Mhz}$	0	25		25		9000		pF
Output capacitance	$C_{oes}$							260		pF
Reverse transfer capacitance	$C_{res}$							34		pF
Gate charge	$Q_g$	$V_{CC} = 520 \text{ V}$	15		150	25		328		nC

#### Thermal

Thermal resistance junction to sink <sup>(2)</sup>	$R_{th(j-s)}$	$\lambda_{paste} = 3,4 \text{ W/mK}$ (PSX)						0,65		K/W
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#### Dynamic

Turn-on delay time	$t_{d(on)}$	$R_{gon} = 2 \Omega$ $R_{goff} = 2 \Omega$	-5/15	350	90	25 125 150		47,8 50 49,4		ns
Rise time	$t_r$					25 125 150		8,6 10 10,4		ns
Turn-off delay time	$t_{d(off)}$					25 125 150		147 170 176,4		ns
Fall time	$t_f$					25 125 150		10,58 19,16 22,34		ns
Turn-on energy (per pulse)	$E_{on}$					25 125 150		0,346 0,608 0,705		mWs
Turn-off energy (per pulse)	$E_{off}$					25 125 150		1,07 1,56 1,74		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	

### Buck Diode

#### Static

Forward voltage	$V_F$				150	25 125 150		1,53 1,49 1,47	1,92 <sup>(1)</sup>	V
Reverse leakage current	$I_R$	$V_i = 650$ V				25			7,6	μA

#### Thermal

Thermal resistance junction to sink <sup>(2)</sup>	$R_{th(j-s)}$	$\lambda_{paste} = 3,4$ W/mK (PSX)						0,75		K/W
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#### Dynamic

Peak recovery current	$I_{RRM}$	$di/dt=7165$ A/μs $di/dt=8521$ A/μs $di/dt=7698$ A/μs	-5/15	350	90	25 125 150		123,93 158,19 167,21		A
Reverse recovery time	$t_{rr}$					25 125 150		43,67 73,66 84,84		ns
Recovered charge	$Q_r$					25 125 150		3,35 6,78 7,78		μC
Reverse recovered energy	$E_{rec}$					25 125 150		0,87 1,72 1,92		mWs
Peak rate of fall of recovery current	$(di_{rr}/dt)_{max}$					25 125 150		3889 3024 3127		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	

### Boost Switch

#### Static

Gate-emitter threshold voltage	$V_{GE(th)}$	$V_{CE} = V_{GE}$			0,0015	25	3,2	4	4,8	V
Collector-emitter saturation voltage	$V_{CE(sat)}$		15		150	25 125 150		1,43 1,52 1,55	1,75 <sup>(1)</sup>	V
Collector-emitter cut-off current	$I_{CES}$		0	650		25			100	µA
Gate-emitter leakage current	$I_{GES}$		20	0		25			200	nA
Internal gate resistance	$r_g$							None		Ω
Input capacitance	$C_{ies}$	$f = 1 \text{ Mhz}$	0	25		25		9000		pF
Output capacitance	$C_{oes}$							260		pF
Reverse transfer capacitance	$C_{res}$							34		pF
Gate charge	$Q_g$	$V_{CC} = 520 \text{ V}$	15		150	25		328		nC

#### Thermal

Thermal resistance junction to sink <sup>(2)</sup>	$R_{th(j-s)}$	$\lambda_{paste} = 3,4 \text{ W/mK}$ (PSX)						0,65		K/W
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#### Dynamic

Turn-on delay time	$t_{d(on)}$	$R_{gon} = 2 \Omega$ $R_{goff} = 2 \Omega$	-5/15	350	90	25 125 150		52,4 51,6 51,8		ns
Rise time	$t_r$					25 125 150		9,6 11 11,4		ns
Turn-off delay time	$t_{d(off)}$					25 125 150		130,8 153,2 160		ns
Fall time	$t_f$					25 125 150		13,31 19,35 22,14		ns
Turn-on energy (per pulse)	$E_{on}$					25 125 150		0,666 1,23 1,39		mWs
Turn-off energy (per pulse)	$E_{off}$					25 125 150		1,14 1,68 1,86		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	

### Boost Diode

#### Static

Forward voltage	$V_F$				150	25 125 150		1,53 1,49 1,47	1,92 <sup>(1)</sup>	V
Reverse leakage current	$I_R$	$V_i = 650$ V				25			7,6	µA

#### Thermal

Thermal resistance junction to sink <sup>(2)</sup>	$R_{th(j-s)}$	$\lambda_{paste} = 3,4$ W/mK (PSX)						0,75		K/W
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#### Dynamic

Peak recovery current	$I_{RRM}$	$di/dt=9576$ A/µs $di/dt=6720$ A/µs $di/dt=7333$ A/µs	-5/15	350	90	25 125 150		101,45 127,39 133,06		A
Reverse recovery time	$t_{rr}$					25 125 150		54,35 88,39 100,89		ns
Recovered charge	$Q_r$					25 125 150		3,47 6,78 7,84		µC
Reverse recovered energy	$E_{rec}$					25 125 150		0,807 1,47 1,67		mWs
Peak rate of fall of recovery current	$(di_{rr}/dt)_{max}$					25 125 150		2283 1335 1270		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	

### Boost Sw. Inv. Diode

#### Static

Forward voltage	$V_F$			150	25 125 150	1,18	1,66 1,61 1,59	1,82 <sup>(1)</sup>	V
Reverse leakage current	$I_R$	$V_i = 650$ V			25			1,8	µA

#### Thermal

Thermal resistance junction to sink <sup>(2)</sup>	$R_{th(j-s)}$	$\lambda_{paste} = 3,4$ W/mK (PSX)					0,64		K/W
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### Thermistor

#### Static

Rated resistance	$R$				25		22		kΩ
Deviation of $R_{100}$	$\Delta_{R/R}$	$R_{100} = 1484$ Ω			100	-5		5	%
Power dissipation	$P$						5		mW
Power dissipation constant	$d$				25		1,5		mW/K
B-value	$B_{(25/50)}$	Tol. $\pm 1$ %					3962		K
B-value	$B_{(25/100)}$	Tol. $\pm 1$ %					4000		K
Vincotech Thermistor Reference								I	

<sup>(1)</sup> Value at chip level

<sup>(2)</sup> Only valid with pre-applied Vincotech thermal interface material.



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# 10-PY07NIA150S502-L365F58Y datasheet

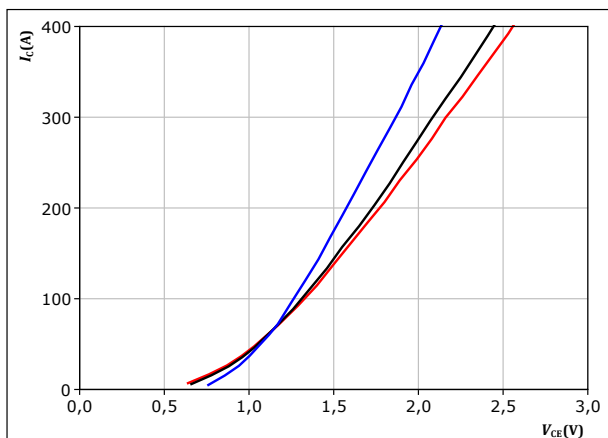
## Buck Switch Characteristics

figure 1.

IGBT

Typical output characteristics

$$I_C = f(V_{CE})$$



$t_p = 250 \mu s$   
 $V_{GE} = 15 V$

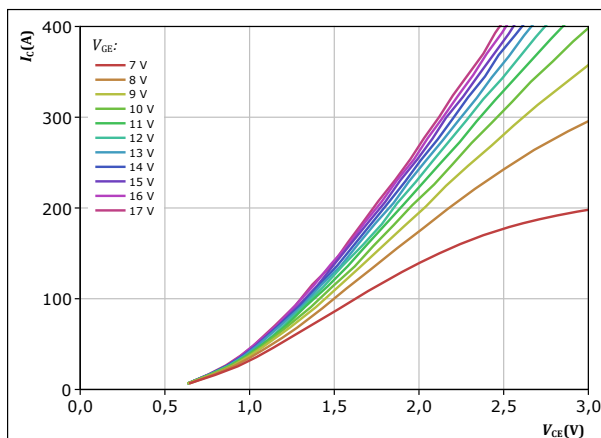
$T_j$ :  
— 25 °C  
— 125 °C  
— 150 °C

figure 2.

IGBT

Typical output characteristics

$$I_C = f(V_{CE})$$



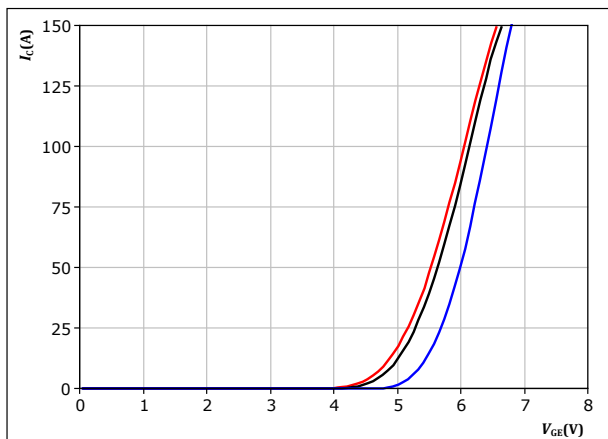
$t_p = 250 \mu s$   
 $T_j = 150 ^\circ C$   
 $V_{GE}$  from 7 V to 17 V in steps of 1 V

figure 3.

IGBT

Typical transfer characteristics

$$I_C = f(V_{GE})$$



$t_p = 250 \mu s$   
 $V_{CE} = 10 V$

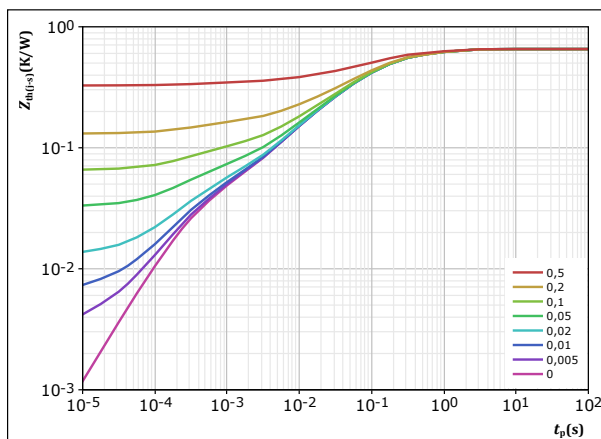
$T_j$ :  
— 25 °C  
— 125 °C  
— 150 °C

figure 4.

IGBT

Transient thermal impedance as a function of pulse width

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



$D = t_p / T$   
 $R_{th(j-s)} = 0,654 K/W$   
IGBT thermal model values  

$R (K/W)$	$\tau (s)$
1,13E-01	8,46E-01
2,91E-01	1,23E-01
1,38E-01	3,33E-02
6,68E-02	8,32E-03
1,32E-02	2,63E-03
3,21E-02	3,23E-04



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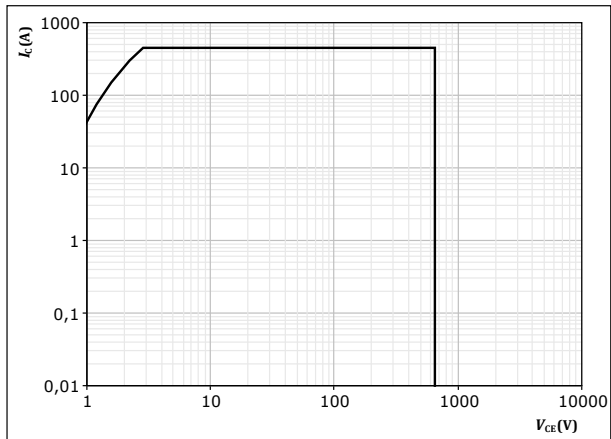
## Buck Switch Characteristics

figure 5.

IGBT

Safe operating area

$I_C = f(V_{CE})$



$D = \text{single pulse}$

$T_s = 80 \text{ } ^\circ\text{C}$   
 $V_{GE} = 15 \text{ V}$   
 $T_j = T_{jmax}$



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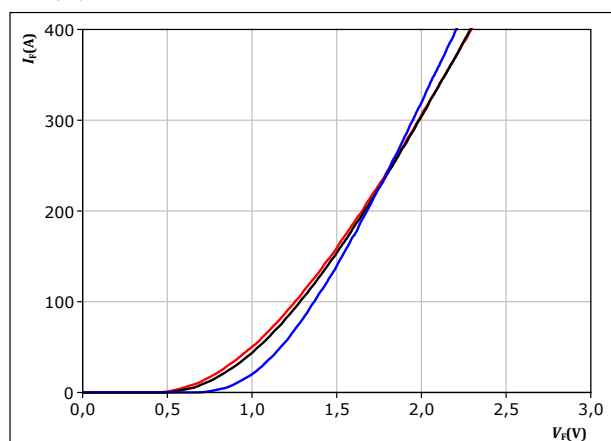
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datasheet

## Buck Diode Characteristics

figure 6. FWD

Typical forward characteristics

$$I_F = f(V_F)$$



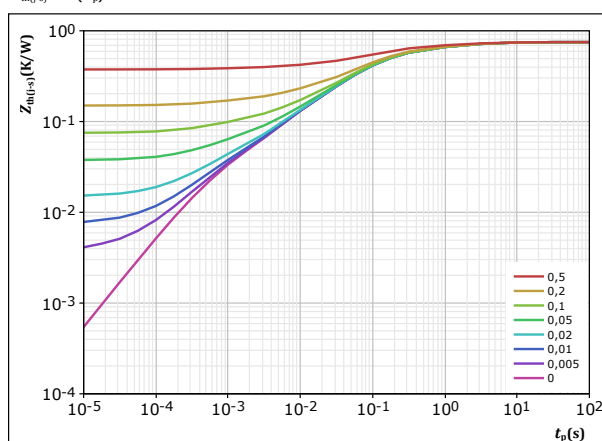
$t_p = 250 \mu s$

$T_j$ :  
— 25 °C  
— 125 °C  
— 150 °C

figure 7. FWD

Transient thermal impedance as a function of pulse width

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



$D = t_p / T$   
 $R_{th(j-s)} = 0,75 \text{ K/W}$   
FWD thermal model values

$R \text{ (K/W)}$	$\tau \text{ (s)}$
6,17E-02	4,36E+00
1,22E-01	8,59E-01
2,77E-01	1,50E-01
2,01E-01	4,63E-02
6,55E-02	6,81E-03
2,23E-02	5,75E-04



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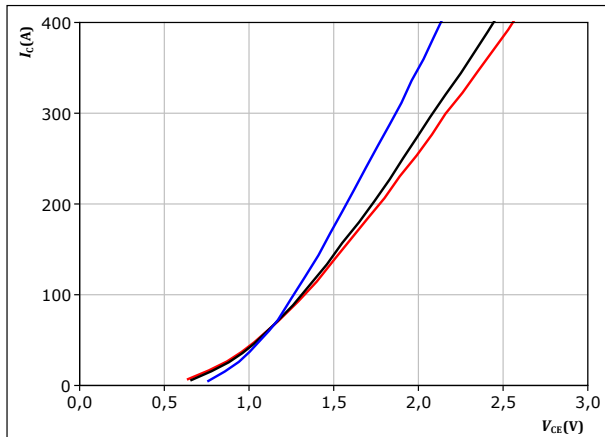
# 10-PY07NIA150S502-L365F58Y datasheet

## Boost Switch Characteristics

figure 8. IGBT

Typical output characteristics

$$I_C = f(V_{CE})$$

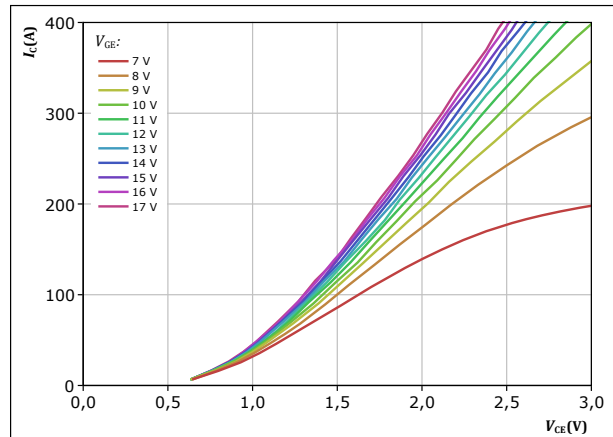


$t_p = 250 \mu s$   
 $V_{GE} = 15 V$   
 $T_j:$  25 °C, 125 °C, 150 °C

figure 9. IGBT

Typical output characteristics

$$I_C = f(V_{CE})$$

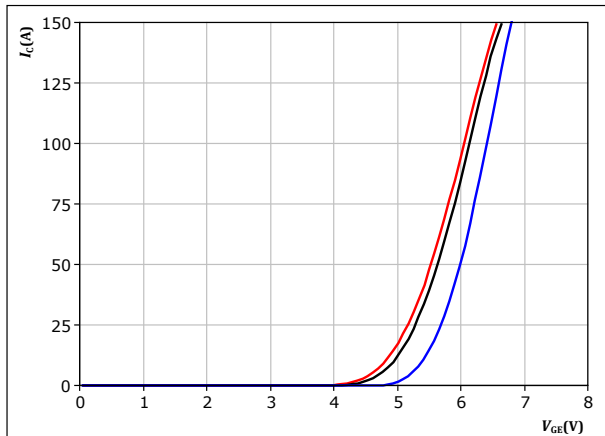


$t_p = 250 \mu s$   
 $T_j = 150 \text{ °C}$   
 $V_{GE}$  from 7 V to 17 V in steps of 1 V

figure 10. IGBT

Typical transfer characteristics

$$I_C = f(V_{GE})$$

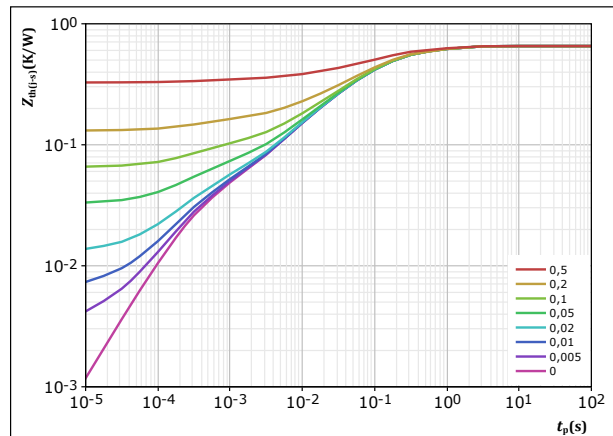


$t_p = 250 \mu s$   
 $V_{CE} = 10 V$   
 $T_j:$  25 °C, 125 °C, 150 °C

figure 11. IGBT

Transient thermal impedance as a function of pulse width

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



$D = t_p / T = 0.654$   
 $R_{th(j-s)} = K/W$   
IGBT thermal model values  

$R$ (K/W)	$\tau$ (s)
1,13E-01	8,46E-01
2,91E-01	1,23E-01
1,38E-01	3,33E-02
6,68E-02	8,32E-03
1,32E-02	2,63E-03
3,21E-02	3,23E-04





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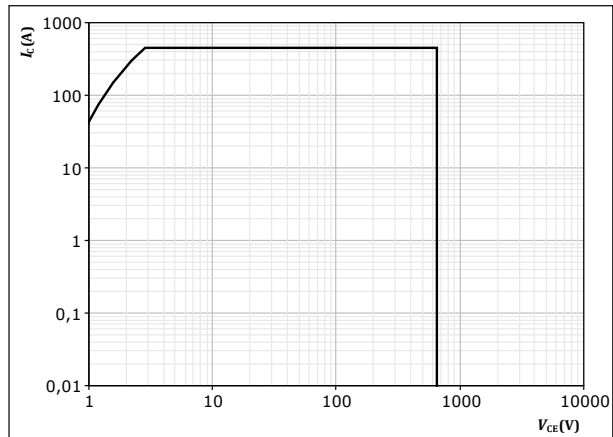
## Boost Switch Characteristics

figure 12.

IGBT

Safe operating area

$$I_C = f(V_{CE})$$



$D = \text{single pulse}$

$T_s = 80 \text{ } ^\circ\text{C}$   
 $V_{GE} = 15 \text{ V}$   
 $T_j = T_{jmax}$



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## Boost Diode Characteristics

figure 13.

FWD

Typical forward characteristics

$$I_F = f(V_F)$$

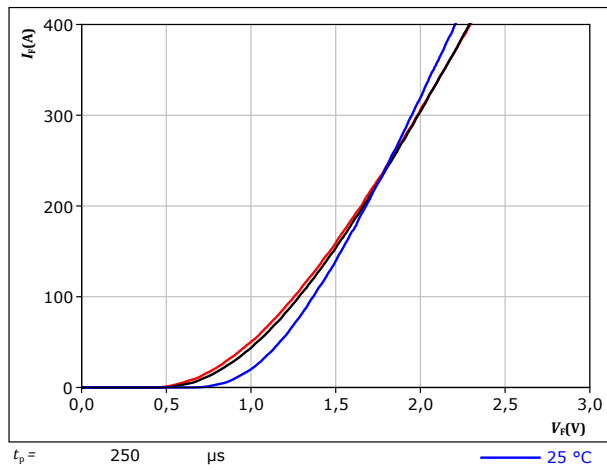
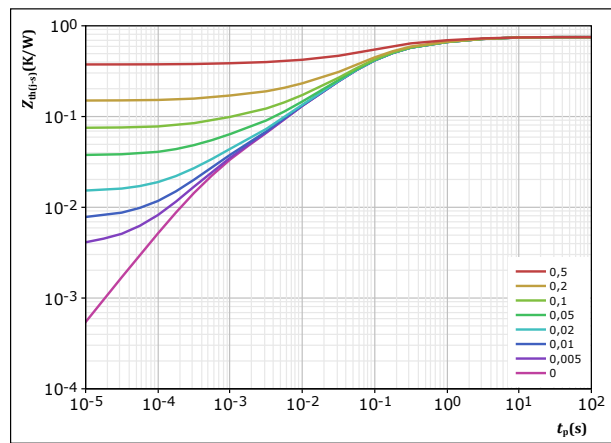


figure 14.

FWD

Transient thermal impedance as a function of pulse width

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



$D =$	$t_p / T$
$R_{th(j-s)} =$	0,75 K/W
FWD thermal model values	
$R$ (K/W)	$\tau$ (s)
6,17E-02	4,36E+00
1,22E-01	8,59E-01
2,77E-01	1,50E-01
2,01E-01	4,63E-02
6,55E-02	6,81E-03
2,23E-02	5,75E-04



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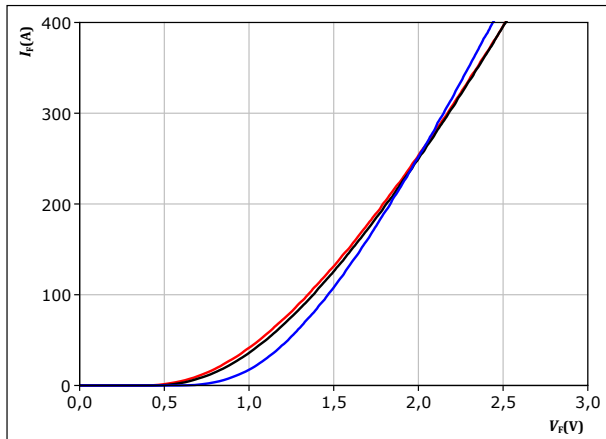
## Boost Sw. Inv. Diode Characteristics

figure 15.

FWD

Typical forward characteristics

$$I_F = f(V_F)$$



$t_p = 250 \mu s$

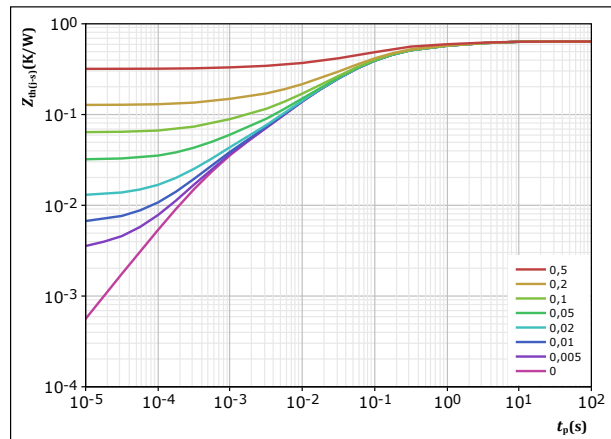
$T_j$ :  
— 25 °C  
— 125 °C  
— 150 °C

figure 16.

FWD

Transient thermal impedance as a function of pulse width

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



$D =$

$t_p / T$

$R_{th(j-s)} = 0,638 \text{ K/W}$

FWD thermal model values

$R \text{ (K/W)}$	$\tau \text{ (s)}$
6,14E-02	3,48E+00
1,03E-01	5,85E-01
2,81E-01	9,46E-02
1,21E-01	2,14E-02
4,83E-02	5,07E-03
2,26E-02	5,92E-04



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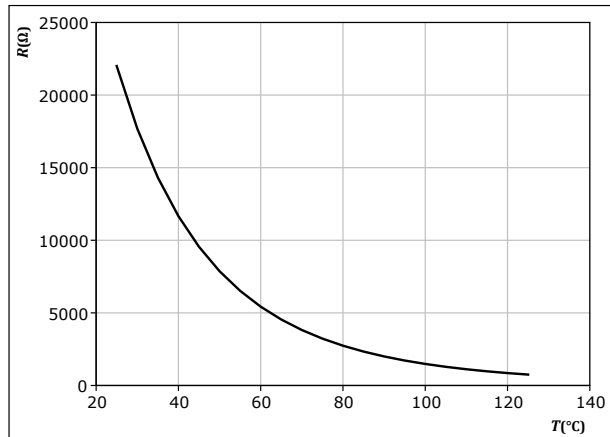
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datasheet

## Thermistor Characteristics

**figure 17.** Thermistor

Typical NTC characteristic as function of temperature

$$R_T = f(T)$$





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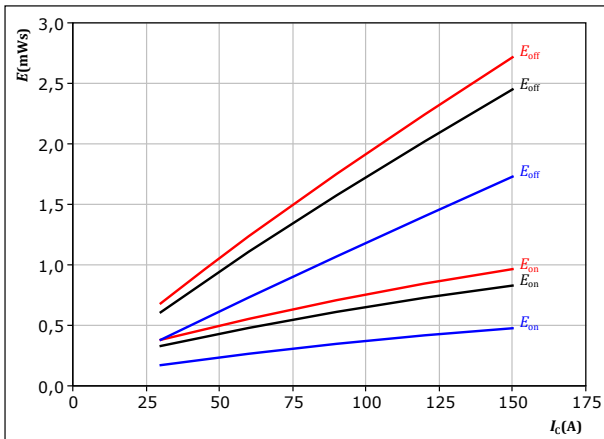
## Buck Switching Characteristics

figure 18.

IGBT

Typical switching energy losses as a function of collector current

$$E = f(I_C)$$



With an inductive load at

$V_{CE} = 350$  V  
 $V_{GE} = -5/15$  V  
 $R_{gon} = 2$   $\Omega$   
 $R_{goff} = 2$   $\Omega$

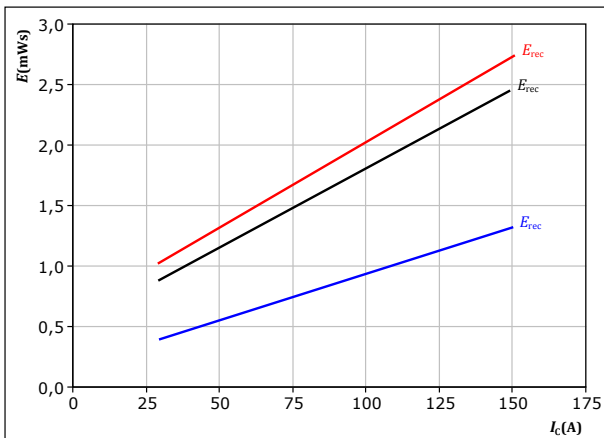
$T_j$ :  
— 25 °C  
— 125 °C  
— 150 °C

figure 20.

FWD

Typical reverse recovered energy loss as a function of collector current

$$E_{rec} = f(I_C)$$



With an inductive load at

$V_{CE} = 350$  V  
 $V_{GE} = -5/15$  V  
 $R_{gon} = 2$   $\Omega$

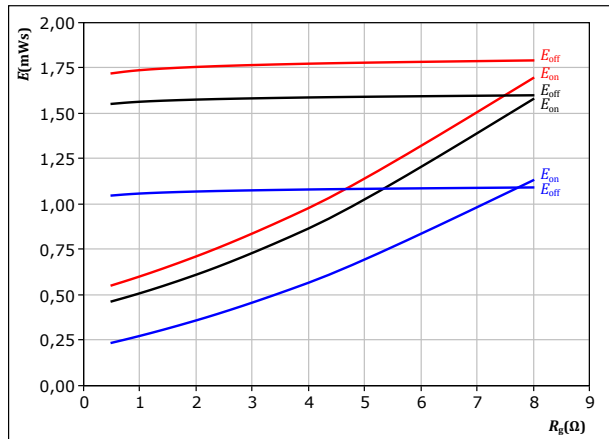
$T_j$ :  
— 25 °C  
— 125 °C  
— 150 °C

figure 19.

IGBT

Typical switching energy losses as a function of gate resistor

$$E = f(R_g)$$



With an inductive load at

$V_{CE} = 350$  V  
 $V_{GE} = -5/15$  V  
 $I_C = 90$  A

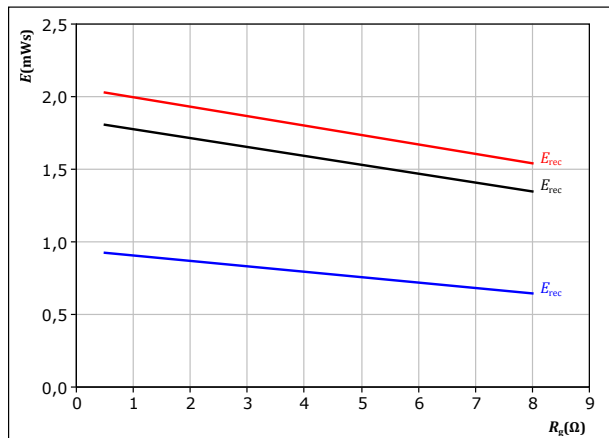
$T_j$ :  
— 25 °C  
— 125 °C  
— 150 °C

figure 21.

FWD

Typical reverse recovered energy loss as a function of gate resistor

$$E_{rec} = f(R_g)$$



With an inductive load at

$V_{CE} = 350$  V  
 $V_{GE} = -5/15$  V  
 $I_C = 90$  A

$T_j$ :  
— 25 °C  
— 125 °C  
— 150 °C



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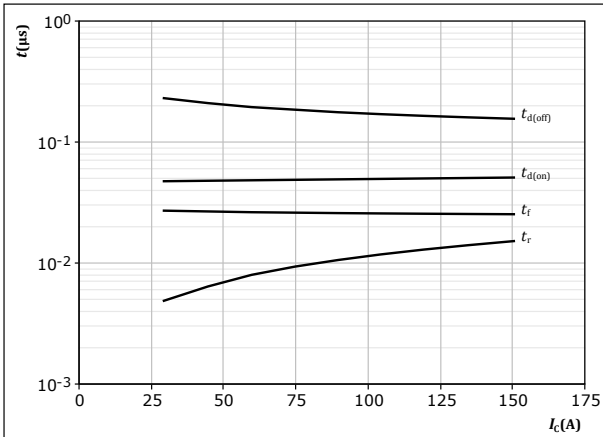
**10-PY07NIA150S502-L365F58Y**  
datasheet

## Buck Switching Characteristics

figure 22.

IGBT

Typical switching times as a function of collector current  
 $t = f(I_C)$



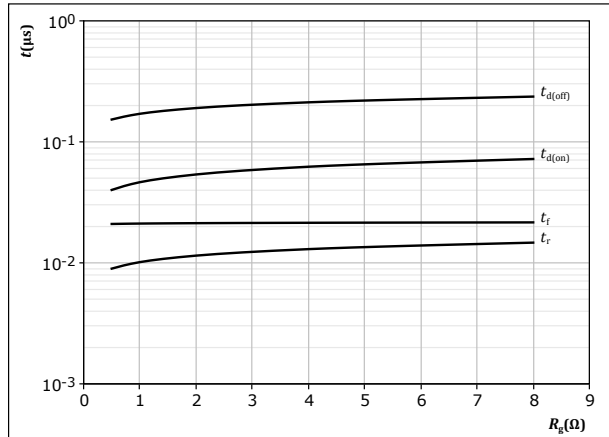
With an inductive load at

$T_j = 150$  °C  
 $V_{CE} = 350$  V  
 $V_{GE} = -5/15$  V  
 $R_{gon} = 2$   $\Omega$   
 $R_{goff} = 2$   $\Omega$

figure 23.

IGBT

Typical switching times as a function of gate resistor  
 $t = f(R_g)$



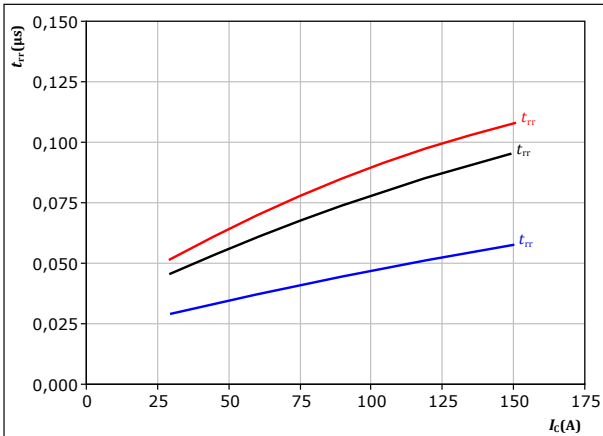
With an inductive load at

$T_j = 150$  °C  
 $V_{CE} = 350$  V  
 $V_{GE} = -5/15$  V  
 $I_C = 90$  A

figure 24.

FWD

Typical reverse recovery time as a function of collector current  
 $t_{rr} = f(I_C)$



With an inductive load at

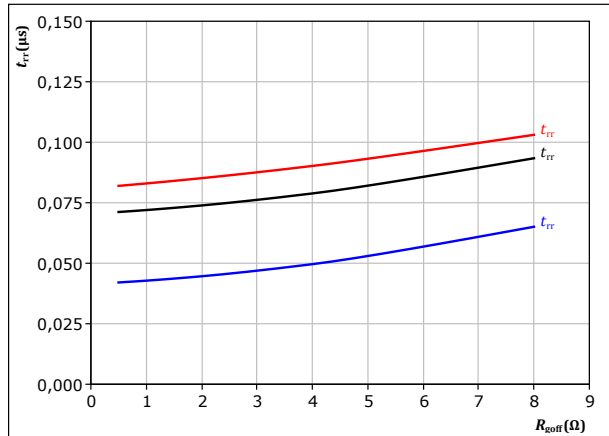
$V_{CE} = 350$  V  
 $V_{GE} = -5/15$  V  
 $R_{gon} = 2$   $\Omega$

$T_j$ : — 25 °C  
— 125 °C  
— 150 °C

figure 25.

FWD

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



With an inductive load at

$V_{CE} = 350$  V  
 $V_{GE} = -5/15$  V  
 $I_C = 90$  A

$T_j$ : — 25 °C  
— 125 °C  
— 150 °C



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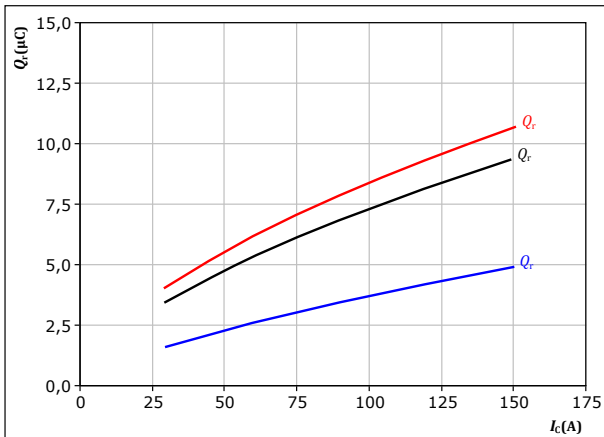
## Buck Switching Characteristics

figure 26.

FWD

Typical recovered charge as a function of collector current

$$Q_r = f(I_c)$$



With an inductive load at

$V_{CE} = 350$  V  
 $V_{GE} = -5/15$  V  
 $R_{gon} = 2$   $\Omega$

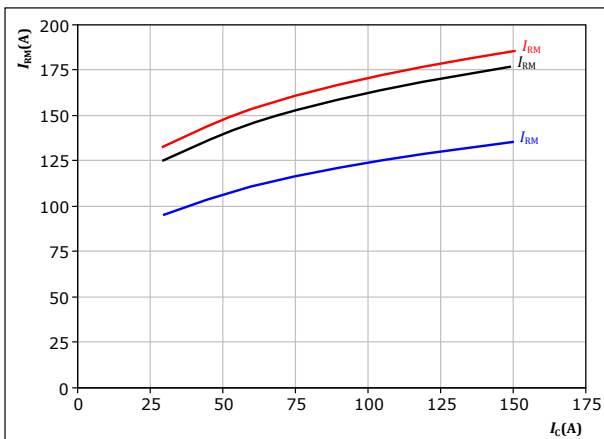
$T_j$ :  
— 25 °C  
— 125 °C  
— 150 °C

figure 28.

FWD

Typical peak reverse recovery current as a function of collector current

$$I_{RM} = f(I_c)$$



With an inductive load at

$V_{CE} = 350$  V  
 $V_{GE} = -5/15$  V  
 $R_{gon} = 2$   $\Omega$

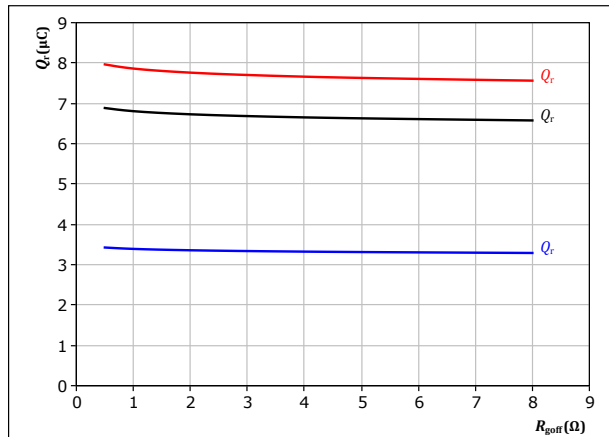
$T_j$ :  
— 25 °C  
— 125 °C  
— 150 °C

figure 27.

FWD

Typical recovered charge as a function of turn off gate resistor

$$Q_r = f(R_{goff})$$



With an inductive load at

$V_{CE} = 350$  V  
 $V_{GE} = -5/15$  V  
 $I_c = 90$  A

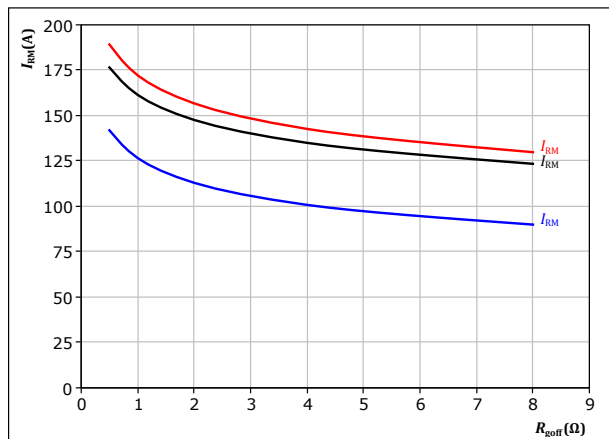
$T_j$ :  
— 25 °C  
— 125 °C  
— 150 °C

figure 29.

FWD

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

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



With an inductive load at

$V_{CE} = 350$  V  
 $V_{GE} = -5/15$  V  
 $I_c = 90$  A

$T_j$ :  
— 25 °C  
— 125 °C  
— 150 °C



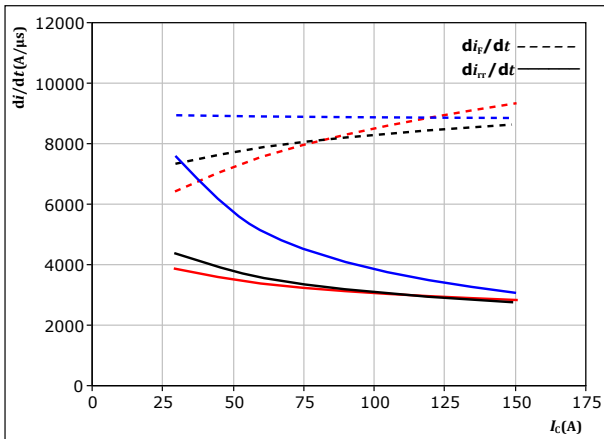
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## Buck Switching Characteristics

figure 30. FWD

Typical rate of fall of forward and reverse recovery current as a function of collector current  
 $di_f/dt, di_r/dt = f(I_C)$



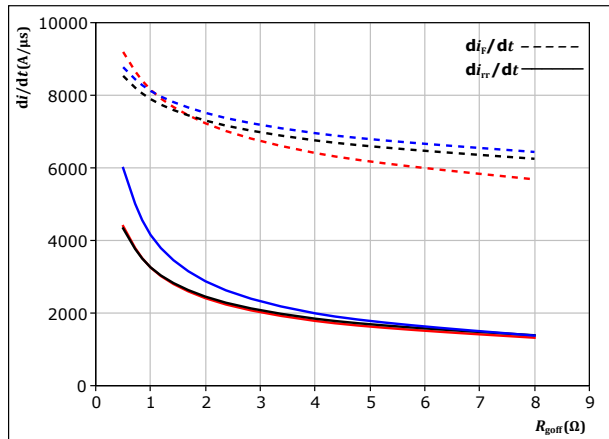
With an inductive load at

$V_{CE} = 350$  V  
 $V_{GE} = -5/15$  V  
 $R_{gon} = 2$  Ω

$T_j$ : 25 °C  
125 °C  
150 °C

figure 31. FWD

Typical rate of fall of forward and reverse recovery current as a function of turn off gate resistor  
 $di_f/dt, di_r/dt = f(R_{goff})$



With an inductive load at

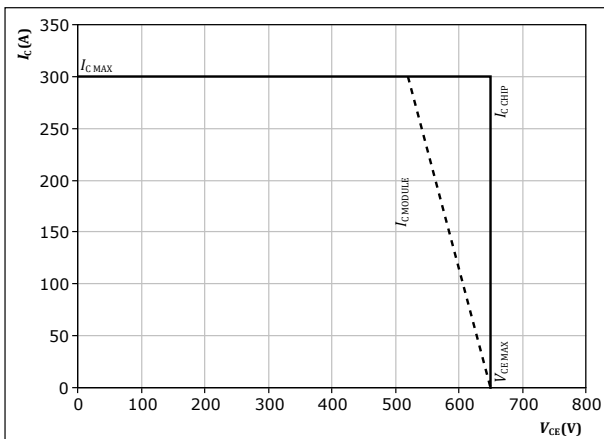
$V_{CE} = 350$  V  
 $V_{GE} = -5/15$  V  
 $I_C = 90$  A

$T_j$ : 25 °C  
125 °C  
150 °C

figure 32. IGBT

Reverse bias safe operating area

$I_C = f(V_{CE})$



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





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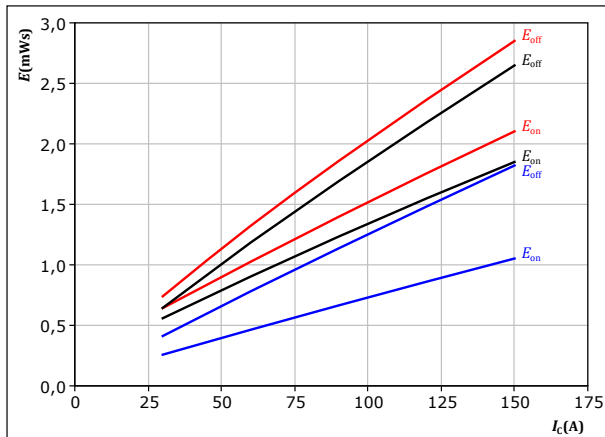
## Boost Switching Characteristics

figure 33.

IGBT

Typical switching energy losses as a function of collector current

$$E = f(I_C)$$



With an inductive load at

$V_{CE} = 350$  V  
 $V_{GE} = -5/15$  V  
 $R_{gon} = 2$   $\Omega$   
 $R_{goff} = 2$   $\Omega$

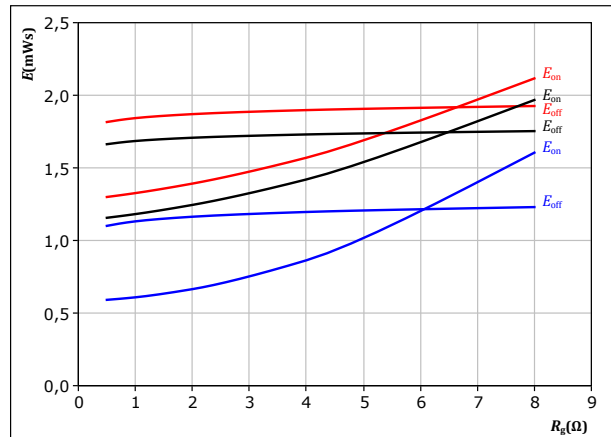
$T_j$ :  
— 25 °C  
— 125 °C  
— 150 °C

figure 34.

IGBT

Typical switching energy losses as a function of gate resistor

$$E = f(R_g)$$



With an inductive load at

$V_{CE} = 350$  V  
 $V_{GE} = -5/15$  V  
 $I_C = 90$  A

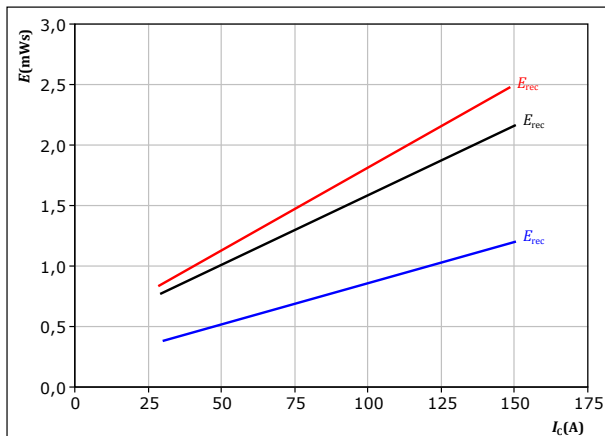
$T_j$ :  
— 25 °C  
— 125 °C  
— 150 °C

figure 35.

FWD

Typical reverse recovered energy loss as a function of collector current

$$E_{rec} = f(I_C)$$



With an inductive load at

$V_{CE} = 350$  V  
 $V_{GE} = -5/15$  V  
 $R_{gon} = 2$   $\Omega$

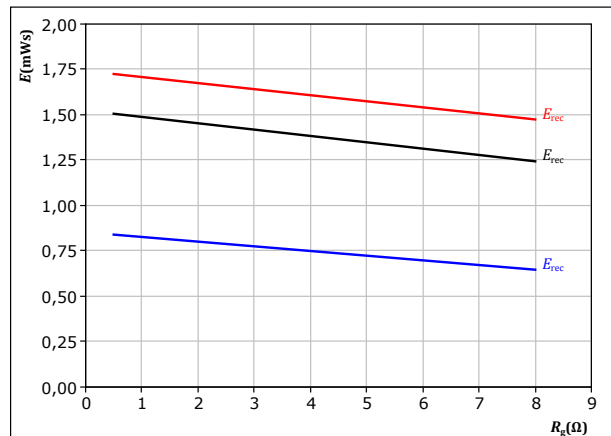
$T_j$ :  
— 25 °C  
— 125 °C  
— 150 °C

figure 36.

FWD

Typical reverse recovered energy loss as a function of gate resistor

$$E_{rec} = f(R_g)$$



With an inductive load at

$V_{CE} = 350$  V  
 $V_{GE} = -5/15$  V  
 $I_C = 90$  A

$T_j$ :  
— 25 °C  
— 125 °C  
— 150 °C



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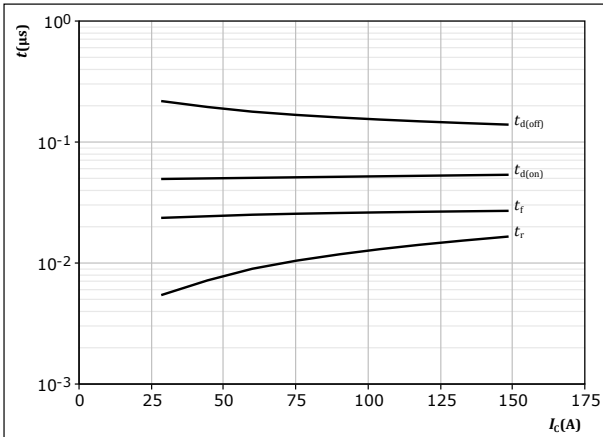
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datasheet

## Boost Switching Characteristics

figure 37.

IGBT

Typical switching times as a function of collector current  
 $t = f(I_C)$



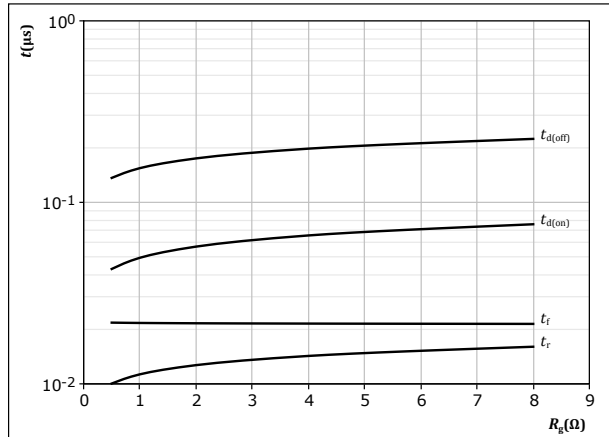
With an inductive load at

$T_j = 150$  °C  
 $V_{CE} = 350$  V  
 $V_{GE} = -5/15$  V  
 $R_{gon} = 2$  Ω  
 $R_{goff} = 2$  Ω

figure 38.

IGBT

Typical switching times as a function of gate resistor  
 $t = f(R_g)$



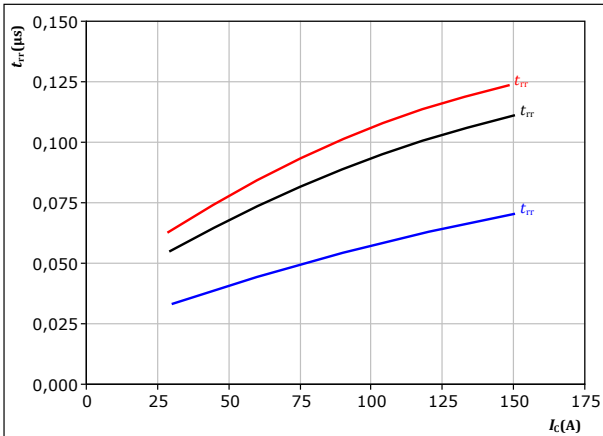
With an inductive load at

$T_j = 150$  °C  
 $V_{CE} = 350$  V  
 $V_{GE} = -5/15$  V  
 $I_C = 90$  A

figure 39.

FWD

Typical reverse recovery time as a function of collector current  
 $t_{rr} = f(I_C)$



With an inductive load at

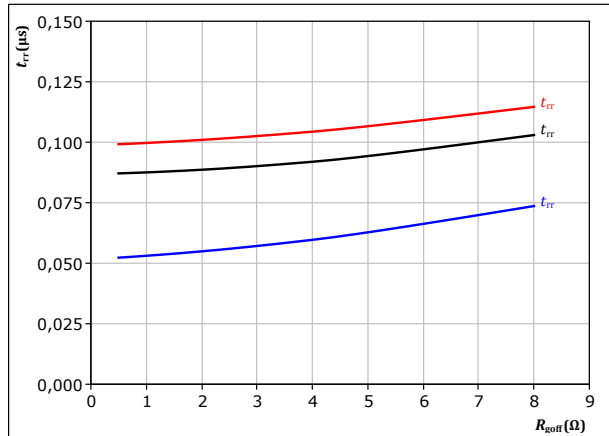
$V_{CE} = 350$  V  
 $V_{GE} = -5/15$  V  
 $R_{gon} = 2$  Ω

$T_j$ : — 25 °C  
— 125 °C  
— 150 °C

figure 40.

FWD

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



With an inductive load at

$V_{CE} = 350$  V  
 $V_{GE} = -5/15$  V  
 $I_C = 90$  A

$T_j$ : — 25 °C  
— 125 °C  
— 150 °C



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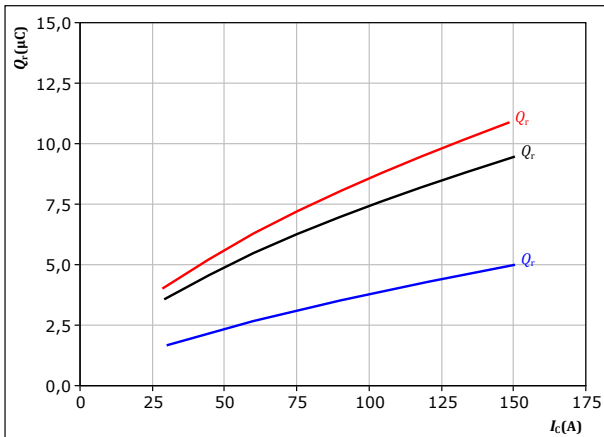
## Boost Switching Characteristics

figure 41.

FWD

Typical recovered charge as a function of collector current

$$Q_r = f(I_c)$$



With an inductive load at

$V_{CE} = 350$  V  
 $V_{GE} = -5/15$  V  
 $R_{gon} = 2$   $\Omega$

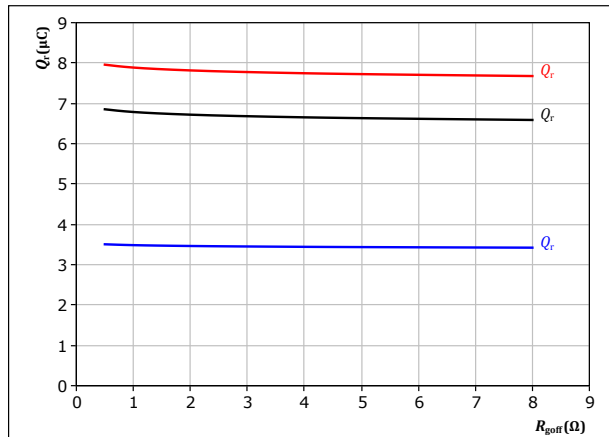
$T_j$ :  
— 25 °C  
— 125 °C  
— 150 °C

figure 42.

FWD

Typical recovered charge as a function of turn off gate resistor

$$Q_r = f(R_{goff})$$



With an inductive load at

$V_{CE} = 350$  V  
 $V_{GE} = -5/15$  V  
 $I_c = 90$  A

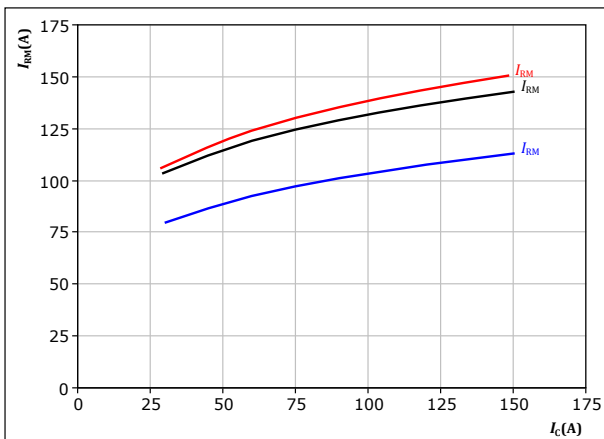
$T_j$ :  
— 25 °C  
— 125 °C  
— 150 °C

figure 43.

FWD

Typical peak reverse recovery current as a function of collector current

$$I_{RM} = f(I_c)$$



With an inductive load at

$V_{CE} = 350$  V  
 $V_{GE} = -5/15$  V  
 $R_{gon} = 2$   $\Omega$

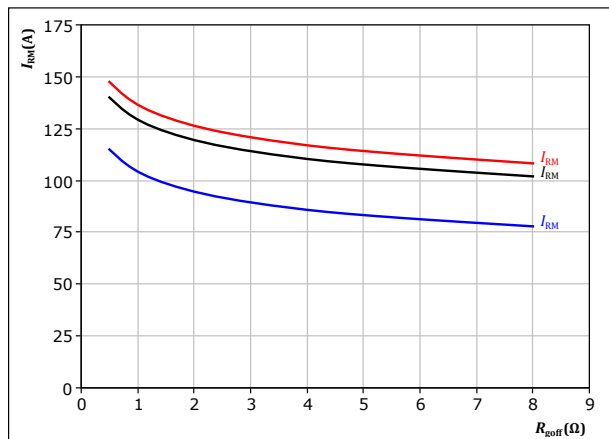
$T_j$ :  
— 25 °C  
— 125 °C  
— 150 °C

figure 44.

FWD

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

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



With an inductive load at

$V_{CE} = 350$  V  
 $V_{GE} = -5/15$  V  
 $I_c = 90$  A

$T_j$ :  
— 25 °C  
— 125 °C  
— 150 °C



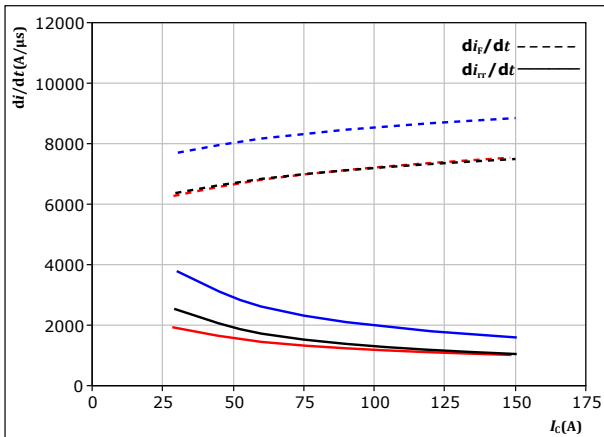
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datasheet

## Boost Switching Characteristics

**figure 45.** FWD

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



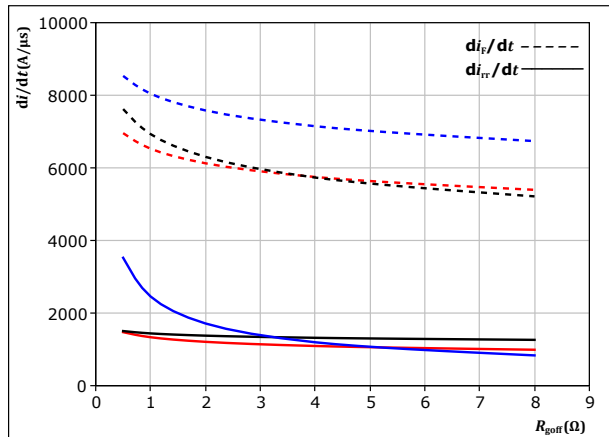
With an inductive load at

$V_{CE} = 350$  V  
 $V_{GE} = -5/15$  V  
 $R_{gon} = 2$   $\Omega$

$T_j = 25$  °C  
125 °C  
150 °C

**figure 46.** FWD

Typical rate of fall of forward and reverse recovery current as a function of turn off gate resistor  
 $di_f/dt, di_{rr}/dt = f(R_{goff})$



With an inductive load at

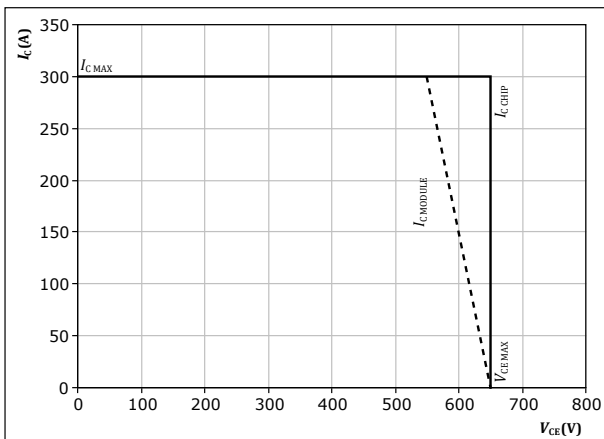
$V_{CE} = 350$  V  
 $V_{GE} = -5/15$  V  
 $I_C = 90$  A

$T_j = 25$  °C  
125 °C  
150 °C

**figure 47.** IGBT

Reverse bias safe operating area

$I_C = f(V_{CE})$



At  $T_j = 150$  °C  
 $R_{gon} = 2$   $\Omega$   
 $R_{goff} = 2$   $\Omega$



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datasheet

## Switching Definitions

figure 48. IGBT

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

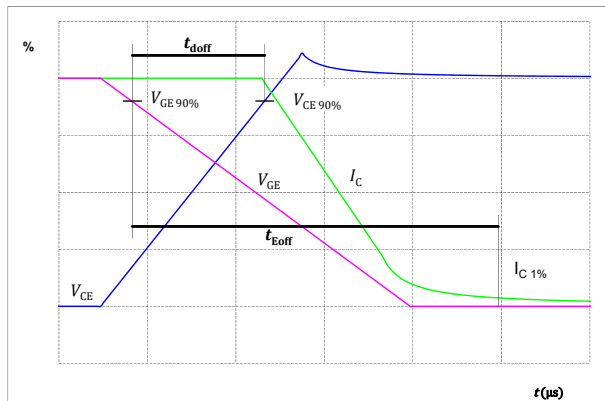


figure 49. IGBT

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

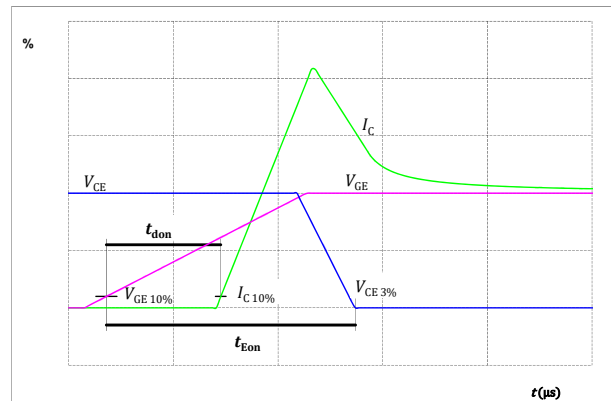


figure 50. IGBT

Turn-off Switching Waveforms & definition of  $t_f$

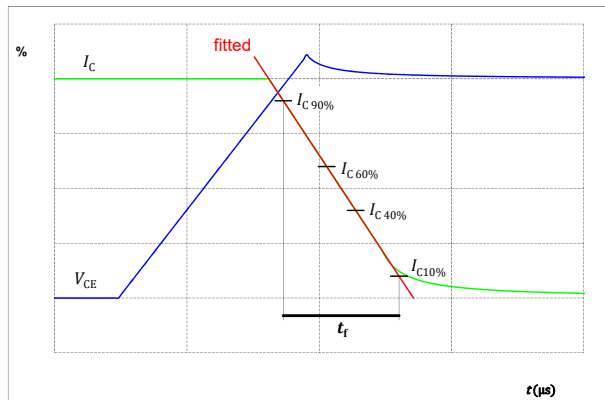
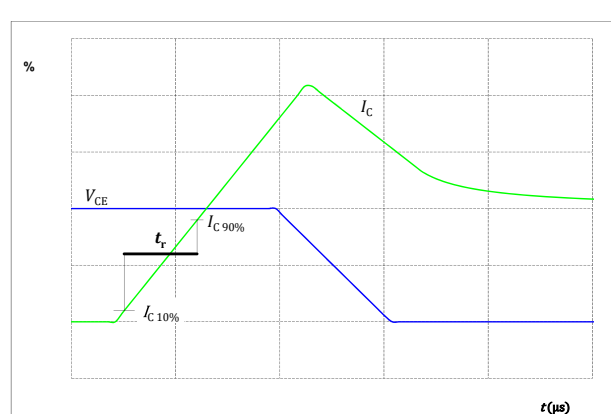


figure 51. IGBT

Turn-on Switching Waveforms & definition of  $t_r$





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datasheet

## Switching Definitions

figure 52.

FWD

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

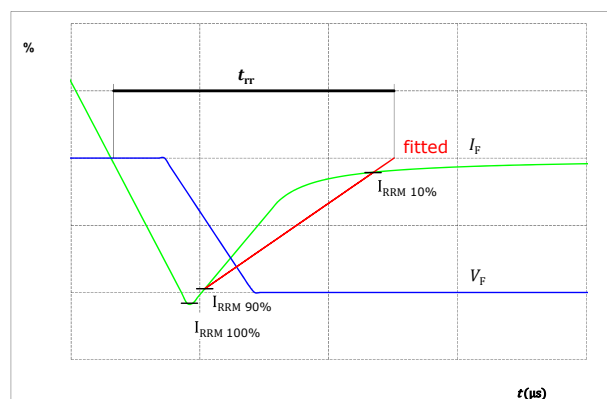
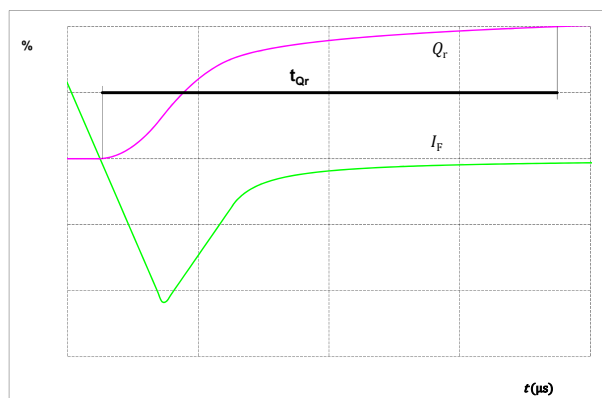


figure 53.

FWD

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






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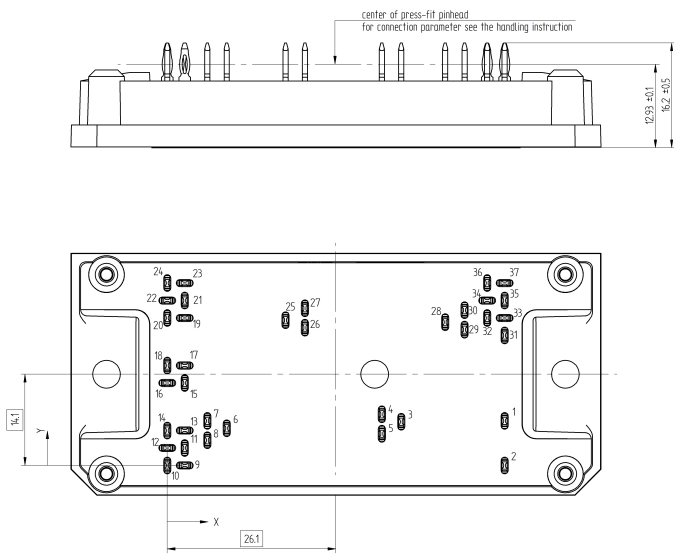
# 10-PY07NIA150S502-L365F58Y

datasheet

Ordering Code	
Version	Ordering Code
Without thermal paste	10-PY07NIA150S502-L365F58Y
With thermal paste (5,2 W/mK, PTM6000HV)	10-PY07NIA150S502-L365F58Y-/7/
With thermal paste (3,4 W/mK, PSX-P7)	10-PY07NIA150S502-L365F58Y-/3/

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

Outline				
Pin table [mm]				
Pin	X	Y	Function	
1	52,2	6,9	Therm1	
2	52,2	0	Therm2	
3	36,2	6,75	S4	
4	33,2	7,9	G14	
5	33,2	4,9	G18	
6	9,2	5,75	S2	
7	6,2	6,9	G12	
8	6,2	3,9	G16	
9	2,7	0	DC-	
10	0	0	DC-	
11	2,7	2,7	DC-	
12	0	2,7	DC-	
13	2,7	5,4	DC-	
14	0	5,4	DC-	
15	2,7	12,75	GND	
16	0	12,75	GND	
17	2,7	15,45	GND	
18	0	15,45	GND	
19	2,7	22,8	DC+	
20	0	22,8	DC+	
21	2,7	25,5	DC+	
22	0	25,5	DC+	
23	2,7	28,2	DC+	
24	0	28,2	DC+	
25	18,3	22,45	S1	
26	21,3	21,3	G15	
27	21,3	24,3	G11	
28	43	22,15	S3	
29	46	21	G17	
30	46	24	G13	
31	52,2	20,1	Ph	
32	49,5	22,8	Ph	
33	52,2	22,8	Ph	
34	49,5	25,5	Ph	
35	52,2	25,5	Ph	
36	49,5	28,2	Ph	
37	52,2	28,2	Ph	

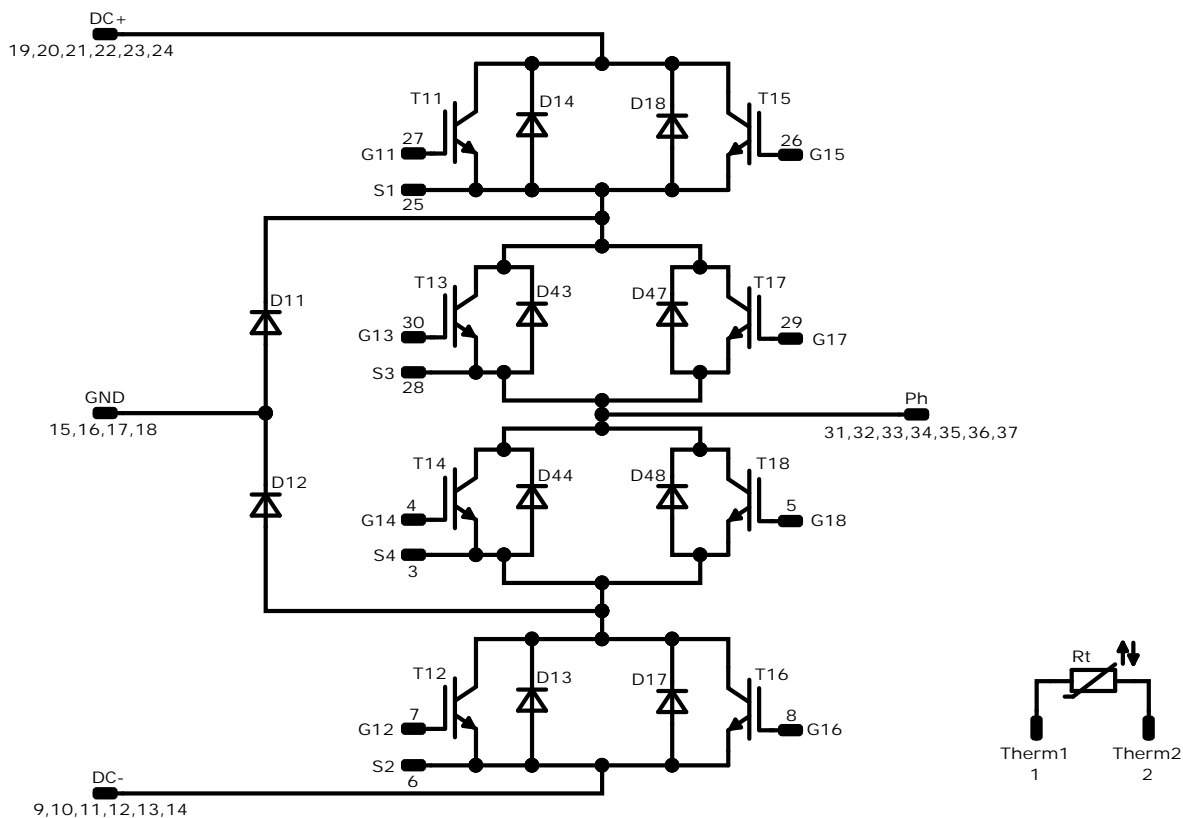




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datasheet

**Pinout**



**Identification**


ID	Component	Voltage	Current	Function	Comment
T11, T15, T12, T16	IGBT	650 V	150 A	Buck Switch	Parallel devices with separate control. Values apply to complete device.
D11, D12	FWD	650 V	150 A	Buck Diode	
T13, T17, T14, T18	IGBT	650 V	150 A	Boost Switch	Parallel devices with separate control. Values apply to complete device.
D13, D17, D14, D18	FWD	650 V	150 A	Boost Diode	
D44, D48, D43, D47	FWD	650 V	150 A	Boost Sw. Inv. Diode	
Rt	Thermistor			Thermistor	





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datasheet

Packaging instruction				
Standard packaging quantity (SPQ) 100	>SPQ	Standard	<SPQ	Sample
Handling instruction				
Handling instructions for <i>flow</i> 1 packages see vincotech.com website.				
Package data				
Package data for <i>flow</i> 1 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-PY07NIA150S502-L365F58Y-D3-14	27 Sep. 2021	New Datasheet format, module is unchanged Update Boost Sw. Inv. Diode static measurements Separate datasheet for pressfit pin version	

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Vincotech products are not authorised for use as critical components in life support devices or systems without the express written approval of Vincotech.

As used herein:

1. Life support devices or systems are devices or systems which, (a) are intended for surgical implant into the body, or (b) support or sustain life, or (c) whose failure to perform when properly used in accordance with instructions for use provided in labelling can be reasonably expected to result in significant injury to the user.
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.