

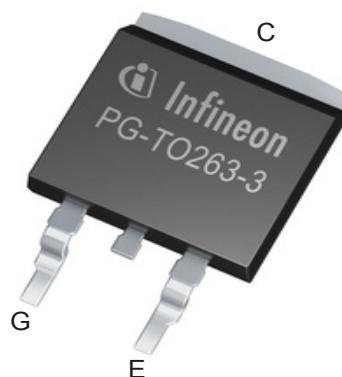
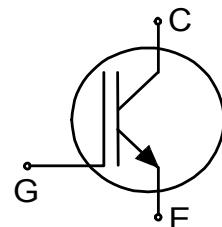
High speed switching series fifth generation

TRENCHSTOP™ 5 high speed soft switching IGBT

Features and Benefits:

High speed S5 technology offering

- High speed smooth switching device for hard & soft switching
- Very Low V_{CEsat} , 1.35V at nominal current
- Plug and play replacement of previous generation IGBTs
- 650V breakdown voltage
- Low Q_G
- Maximum junction temperature 175°C
- Pb-free lead plating; RoHS compliant
- Complete product spectrum and PSpice Models:
<http://www.infineon.com/igbt/>



Potential Applications:

- Energy Generation
 - Solar String Inverter
 - Solar Micro Inverter
- Industrial Power Supplies
 - Industrial SMPS
 - Industrial UPS
- Metal Treatment
 - Welding
- Energy Distribution
 - Energy Storage
- Infrastructure – Charge
 - Charger

Product Validation:

Qualified for industrial applications according to the relevant tests
of JEDEC47/20/22



Key Performance and Package Parameters

Type	V_{CE}	I_C	$V_{CEsat}, T_{vj}=25^\circ\text{C}$	T_{vjmax}	Marking	Package
IGB50N65S5	650V	50A	1.35V	175°C	G50ES5	PG-T0263-3

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Maximum Ratings

For optimum lifetime and reliability, Infineon recommends operating conditions that do not exceed 80% of the maximum ratings stated in this datasheet.

Parameter	Symbol	Value	Unit
Collector-emitter voltage, $T_{vj} \geq 25^\circ\text{C}$	V_{CE}	650	V
DC collector current, limited by T_{vjmax} $T_c = 25^\circ\text{C}$ value limited by bondwire $T_c = 100^\circ\text{C}$	I_C	80.0 63.0	A
Pulsed collector current, t_p limited by T_{vjmax}	I_{Cpuls}	200.0	A
Turn off safe operating area $V_{CE} \leq 650\text{V}$, $T_{vj} \leq 175^\circ\text{C}$, $t_p = 1\mu\text{s}$	-	200.0	A
Gate-emitter voltage Transient Gate-emitter voltage ($t_p \leq 10\mu\text{s}$, $D < 0.010$)	V_{GE}	± 20 ± 30	V
Power dissipation $T_c = 25^\circ\text{C}$ Power dissipation $T_c = 100^\circ\text{C}$	P_{tot}	270.0 135.0	W
Operating junction temperature	T_{vj}	-40...+175	°C
Storage temperature	T_{stg}	-55...+150	°C
Soldering temperature, reflow soldering (MSL1 according to JEDEC J-STA-020)		260	°C

Thermal Resistance

Parameter	Symbol	Conditions	Value			Unit
			min.	typ.	max.	
R_{th} Characteristics						
IGBT thermal resistance, junction - case	$R_{th(j-c)}$		-	-	0.55	K/W
Thermal resistance, min. footprint junction - ambient	$R_{th(j-a)}$		-	-	65	K/W
Thermal resistance, 6cm ² Cu on PCB junction - ambient	$R_{th(j-a)}$		-	-	40	K/W

Electrical Characteristic, at $T_{vj} = 25^\circ\text{C}$, unless otherwise specified

Parameter	Symbol	Conditions	Value			Unit
			min.	typ.	max.	
Static Characteristic						
Collector-emitter breakdown voltage	$V_{(BR)CES}$	$V_{GE} = 0\text{V}$, $I_C = 0.20\text{mA}$	650	-	-	V
Collector-emitter saturation voltage	V_{CESat}	$V_{GE} = 15.0\text{V}$, $I_C = 50.0\text{A}$ $T_{vj} = 25^\circ\text{C}$ $T_{vj} = 125^\circ\text{C}$ $T_{vj} = 175^\circ\text{C}$	-	1.35 1.50 1.60	1.70 - -	V
Gate-emitter threshold voltage	$V_{GE(th)}$	$I_C = 0.50\text{mA}$, $V_{CE} = V_{GE}$	3.2	4.0	4.8	V
Zero gate voltage collector current	I_{CES}	$V_{CE} = 650\text{V}$, $V_{GE} = 0\text{V}$ $T_{vj} = 25^\circ\text{C}$ $T_{vj} = 175^\circ\text{C}$	-	- 2000	50 -	μA
Gate-emitter leakage current	I_{GES}	$V_{CE} = 0\text{V}$, $V_{GE} = 20\text{V}$	-	-	100	nA
Transconductance	g_{fs}	$V_{CE} = 20\text{V}$, $I_C = 50.0\text{A}$	-	62.0	-	S

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Electrical Characteristic, at $T_{vj} = 25^\circ\text{C}$, unless otherwise specified

Parameter	Symbol	Conditions	Value			Unit
			min.	typ.	max.	
Dynamic Characteristic						
Input capacitance	C_{ies}	$V_{CE} = 25\text{V}, V_{GE} = 0\text{V}, f = 1\text{MHz}$	-	3000	-	pF
Output capacitance	C_{oes}		-	50	-	
Reverse transfer capacitance	C_{res}		-	11	-	
Gate charge	Q_G	$V_{CC} = 520\text{V}, I_C = 50.0\text{A}, V_{GE} = 15\text{V}$	-	120.0	-	nC
Internal emitter inductance measured 5mm (0.197 in.) from case	L_E		-	7.0	-	nH

Switching Characteristic, Inductive Load

Parameter	Symbol	Conditions	Value			Unit
			min.	typ.	max.	

IGBT Characteristic, at $T_{vj} = 25^\circ\text{C}$

Turn-on delay time	$t_{d(on)}$	$T_{vj} = 25^\circ\text{C}, V_{CC} = 400\text{V}, I_C = 50.0\text{A}, V_{GE} = 0.0/15.0\text{V}, R_{G(on)} = 8.2\Omega, R_{G(off)} = 8.2\Omega L_\sigma, C_\sigma \text{ from Fig. E}$ Energy losses include "tail" and diode reverse recovery.	-	20	-	ns
Rise time	t_r		-	30	-	ns
Turn-off delay time	$t_{d(off)}$		-	139	-	ns
Fall time	t_f		-	60	-	ns
Turn-on energy	E_{on}		-	1.23	-	mJ
Turn-off energy	E_{off}		-	0.74	-	mJ
Total switching energy	E_{ts}		-	1.97	-	mJ

Turn-on delay time	$t_{d(on)}$	$T_{vj} = 25^\circ\text{C}, V_{CC} = 400\text{V}, I_C = 25.0\text{A}, V_{GE} = 0.0/15.0\text{V}, R_{G(on)} = 8.2\Omega, R_{G(off)} = 8.2\Omega L_\sigma, C_\sigma \text{ from Fig. E}$ Energy losses include "tail" and diode reverse recovery.	-	18	-	ns
Rise time	t_r		-	15	-	ns
Turn-off delay time	$t_{d(off)}$		-	150	-	ns
Fall time	t_f		-	68	-	ns
Turn-on energy	E_{on}		-	0.48	-	mJ
Turn-off energy	E_{off}		-	0.23	-	mJ
Total switching energy	E_{ts}		-	0.71	-	mJ

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Switching Characteristic, Inductive Load

Parameter	Symbol	Conditions	Value			Unit
			min.	typ.	max.	
IGBT Characteristic, at $T_{vj} = 150^{\circ}\text{C}$						
Turn-on delay time	$t_{d(on)}$	$T_{vj} = 150^{\circ}\text{C}$, $V_{CC} = 400\text{V}$, $I_C = 50.0\text{A}$, $V_{GE} = 0.0/15.0\text{V}$, $R_{G(on)} = 8.2\Omega$, $R_{G(off)} = 8.2\Omega$ L_S , C_S from Fig. E Energy losses include "tail" and diode reverse recovery.	-	21	-	ns
Rise time	t_r		-	30	-	ns
Turn-off delay time	$t_{d(off)}$		-	160	-	ns
Fall time	t_f		-	55	-	ns
Turn-on energy	E_{on}		-	1.55	-	mJ
Turn-off energy	E_{off}		-	0.96	-	mJ
Total switching energy	E_{ts}		-	2.51	-	mJ
Turn-on delay time	$t_{d(on)}$	$T_{vj} = 150^{\circ}\text{C}$, $V_{CC} = 400\text{V}$, $I_C = 25.0\text{A}$, $V_{GE} = 0.0/15.0\text{V}$, $R_{G(on)} = 8.2\Omega$, $R_{G(off)} = 8.2\Omega$ L_S , C_S from Fig. E Energy losses include "tail" and diode reverse recovery.	-	19	-	ns
Rise time	t_r		-	15	-	ns
Turn-off delay time	$t_{d(off)}$		-	188	-	ns
Fall time	t_f		-	26	-	ns
Turn-on energy	E_{on}		-	0.63	-	mJ
Turn-off energy	E_{off}		-	0.42	-	mJ
Total switching energy	E_{ts}		-	1.05	-	mJ

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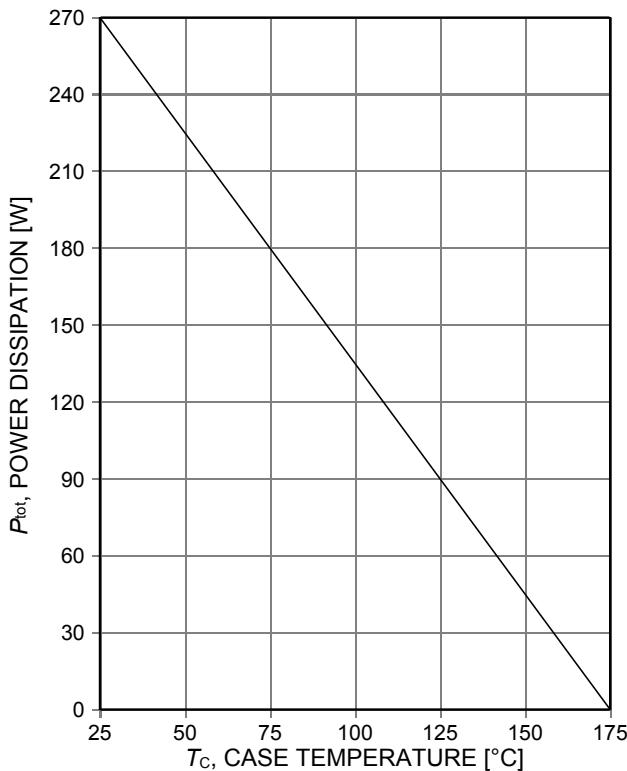


Figure 1. Power dissipation as a function of case temperature
($T_{vj} \leq 175^\circ\text{C}$)

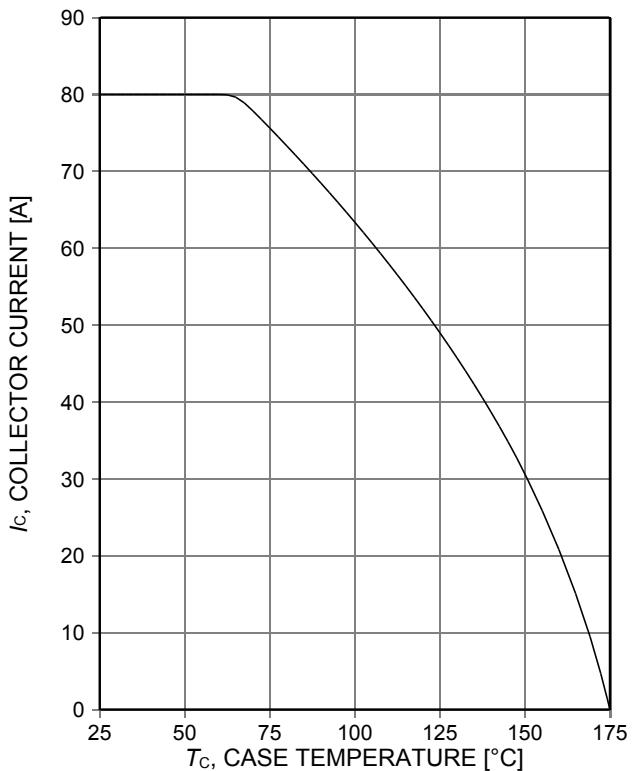


Figure 2. Collector current as a function of case temperature
($V_{GE} \geq 15\text{V}$, $T_{vj} \leq 175^\circ\text{C}$)

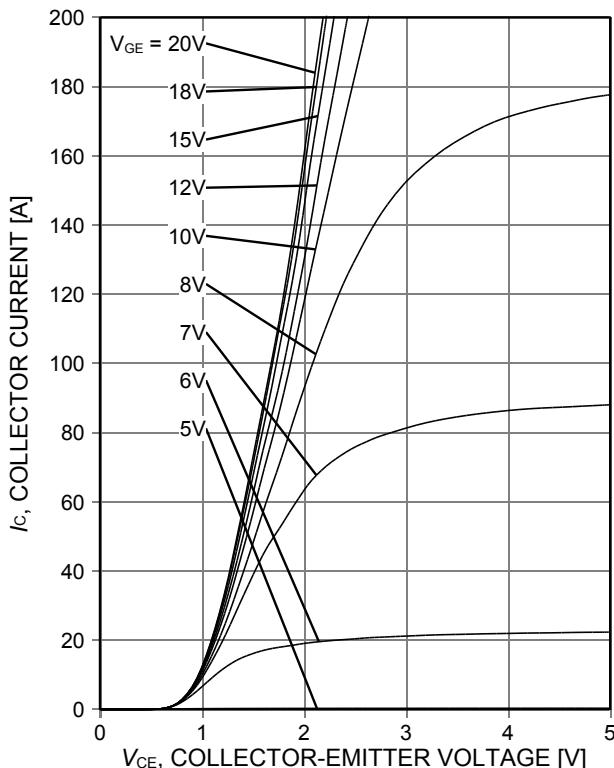


Figure 3. Typical output characteristic
($T_{vj} = 25^\circ\text{C}$)

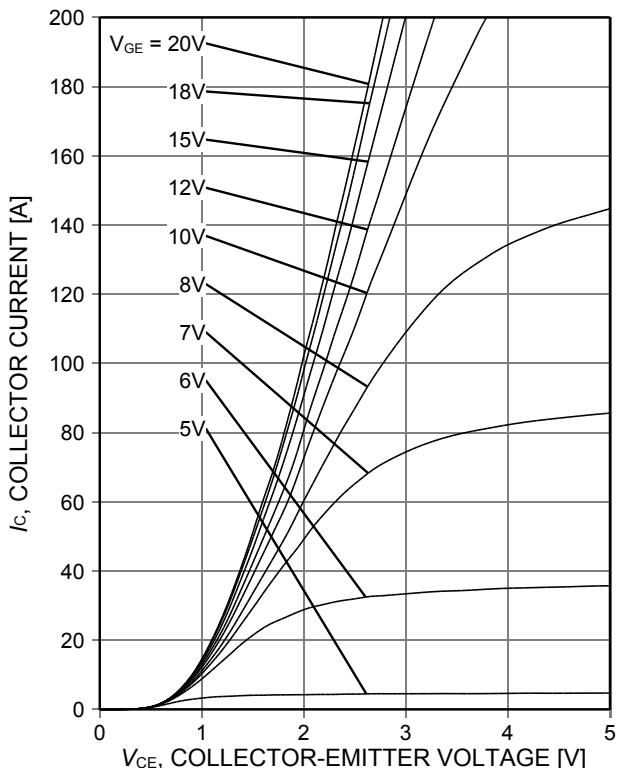


Figure 4. Typical output characteristic
($T_{vj} = 175^\circ\text{C}$)

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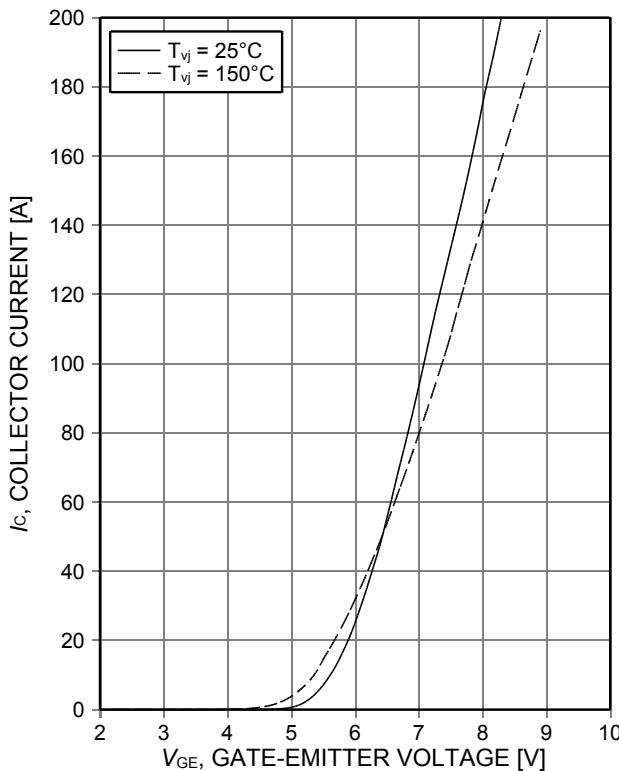


Figure 5. Typical transfer characteristic
($V_{CE}=20\text{V}$)

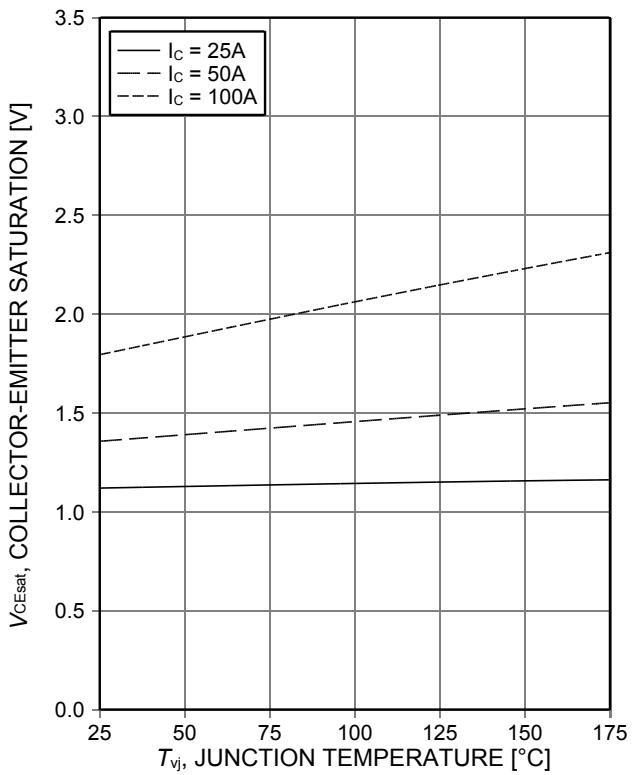


Figure 6. Typical collector-emitter saturation voltage as a function of junction temperature
($V_{GE}=15\text{V}$)

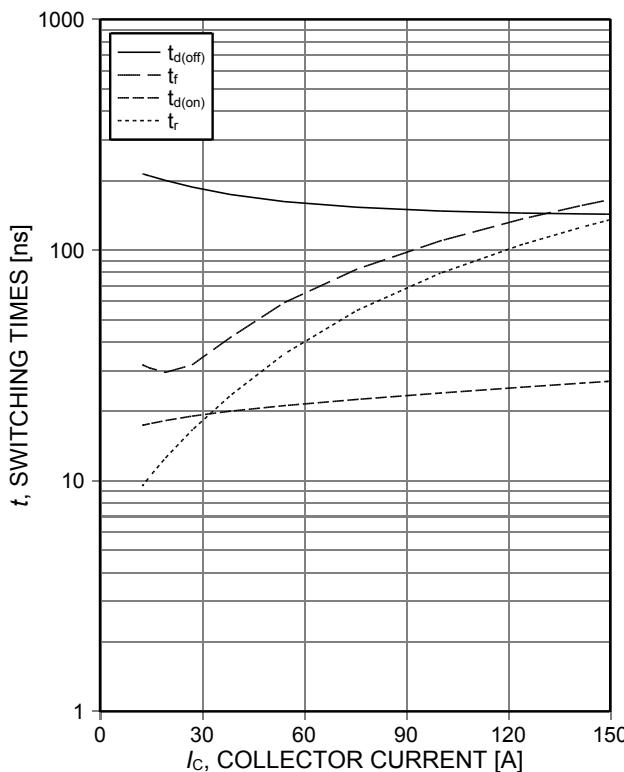


Figure 7. Typical switching times as a function of collector current
(inductive load, $T_{vj}=150^\circ\text{C}$, $V_{CE}=400\text{V}$,
 $V_{GE}=0/15\text{V}$, $r_g=8.2\Omega$, Dynamic test circuit in
Figure E)

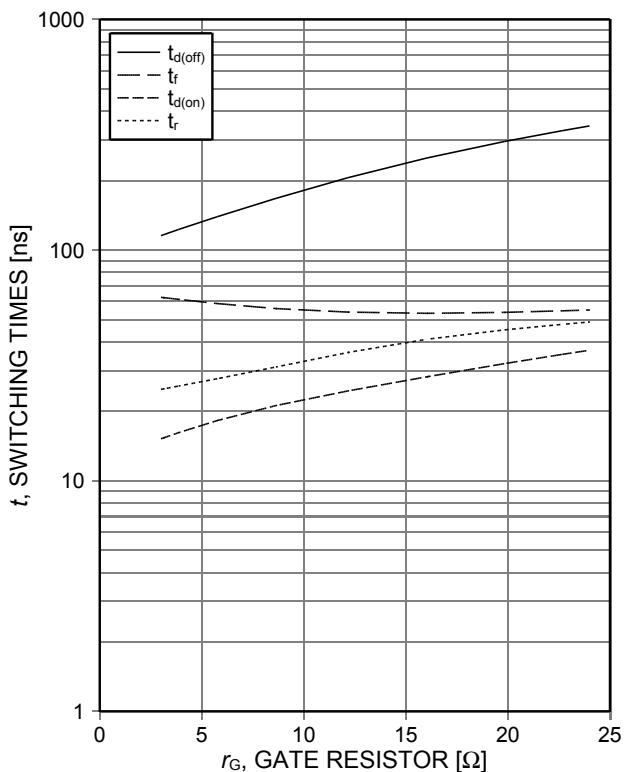


Figure 8. Typical switching times as a function of gate resistor
(inductive load, $T_{vj}=150^\circ\text{C}$, $V_{CE}=400\text{V}$,
 $V_{GE}=0/15\text{V}$, $I_c=50\text{A}$, Dynamic test circuit in
Figure E)

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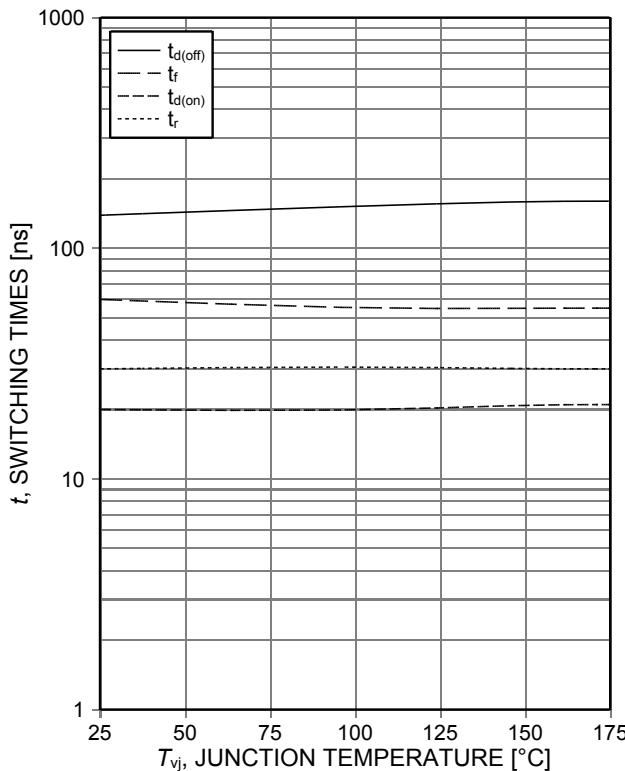


Figure 9. **Typical switching times as a function of junction temperature**
(inductive load, $V_{CE}=400V$, $V_{GE}=0/15V$, $I_C=50A$, $r_G=8.2\Omega$, Dynamic test circuit in Figure E)

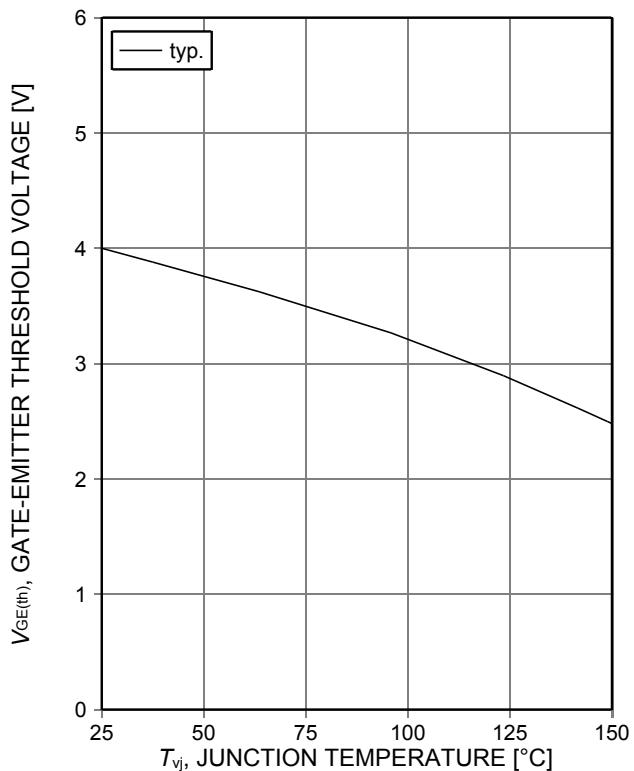


Figure 10. **Gate-emitter threshold voltage as a function of junction temperature**
($I_C=0.5mA$)

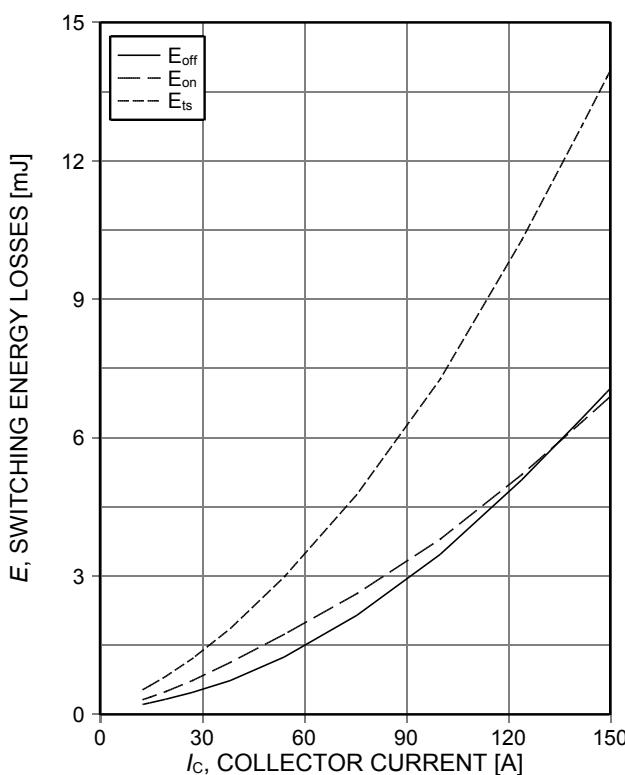


Figure 11. **Typical switching energy losses as a function of collector current**
(inductive load, $T_{vj}=150^\circ C$, $V_{CE}=400V$, $V_{GE}=0/15V$, $r_G=8.2\Omega$, Dynamic test circuit in Figure E)

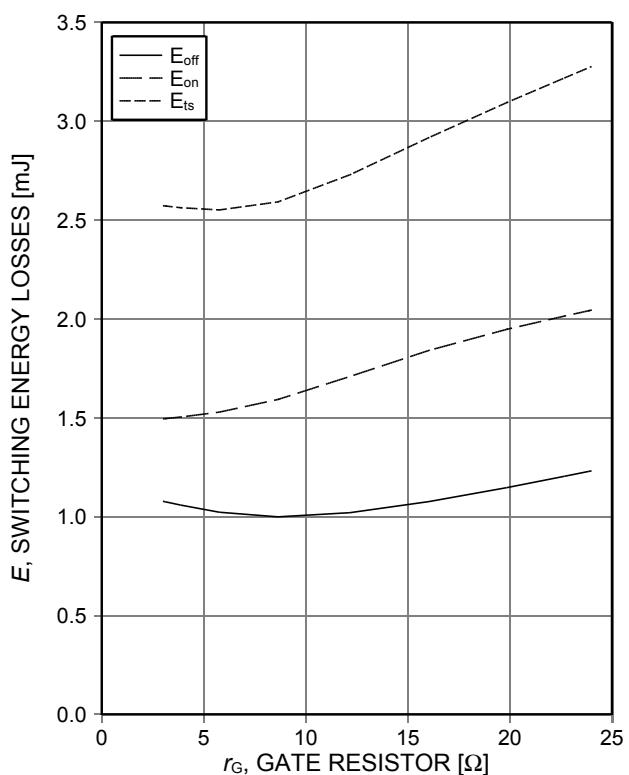


Figure 12. **Typical switching energy losses as a function of gate resistor**
(inductive load, $T_{vj}=150^\circ C$, $V_{CE}=400V$, $V_{GE}=0/15V$, $I_C=50A$, Dynamic test circuit in Figure E)

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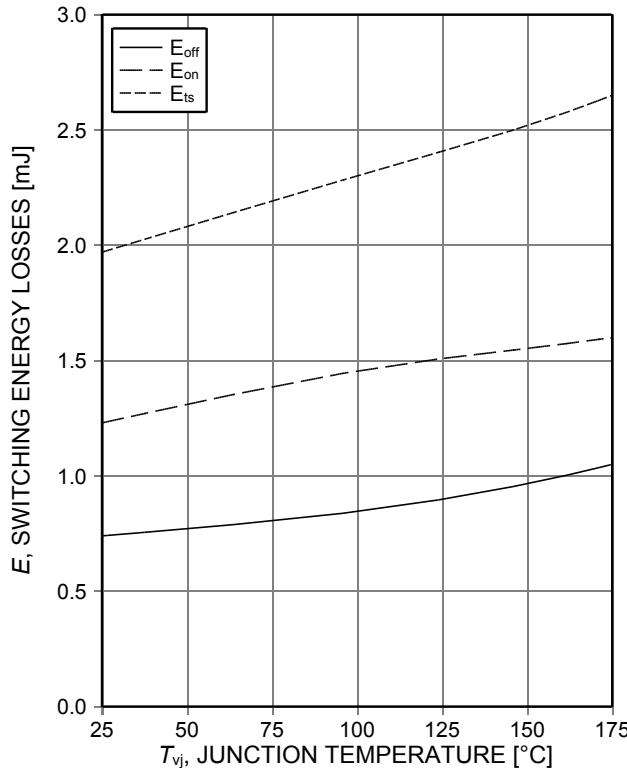


Figure 13. **Typical switching energy losses as a function of junction temperature**
(inductive load, $V_{CE}=400V$, $V_{GE}=0/15V$, $I_C=50A$, $r_G=8.2\Omega$, Dynamic test circuit in Figure E)

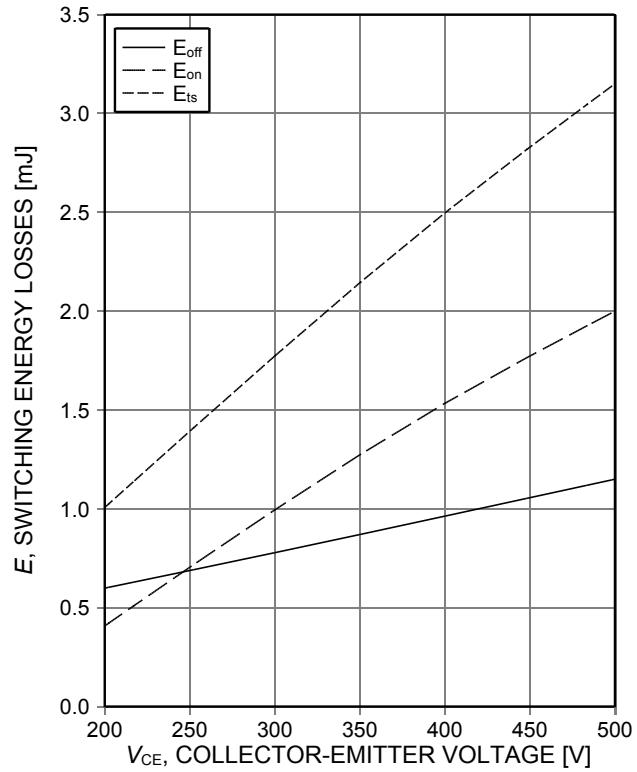


Figure 14. **Typical switching energy losses as a function of collector-emitter voltage**
(inductive load, $T_{vj}=150^\circ C$, $V_{GE}=0/15V$, $I_C=50A$, $r_G=8.2\Omega$, Dynamic test circuit in Figure E)

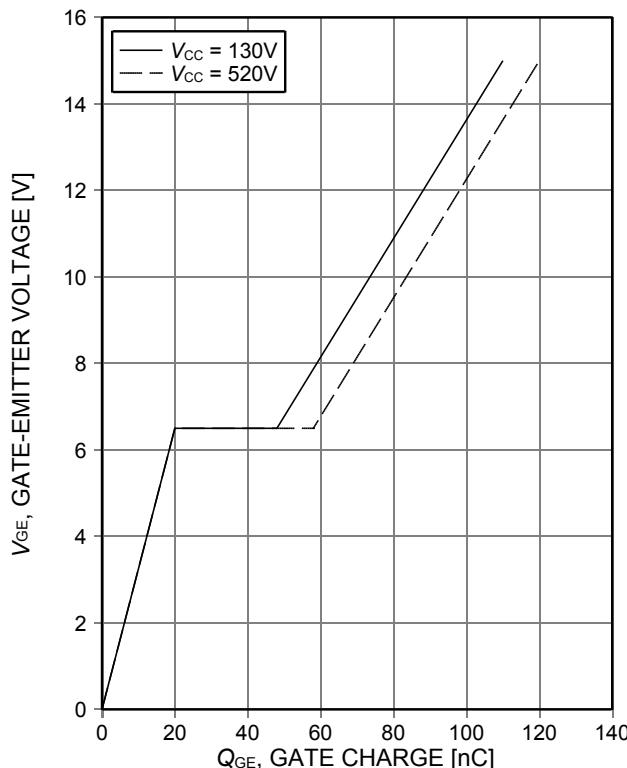


Figure 15. **Typical gate charge**
($I_C=50A$)

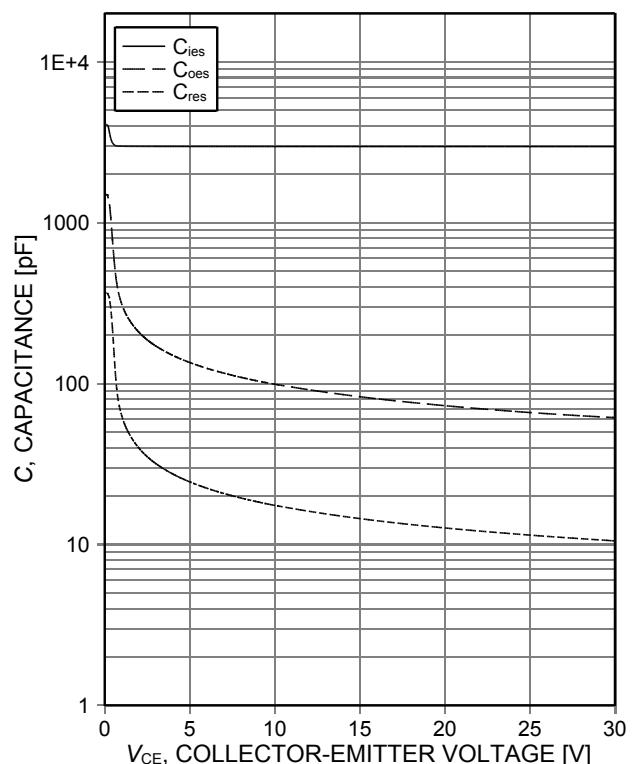


Figure 16. **Typical capacitance as a function of collector-emitter voltage**
($V_{GE}=0V$, $f=1MHz$)

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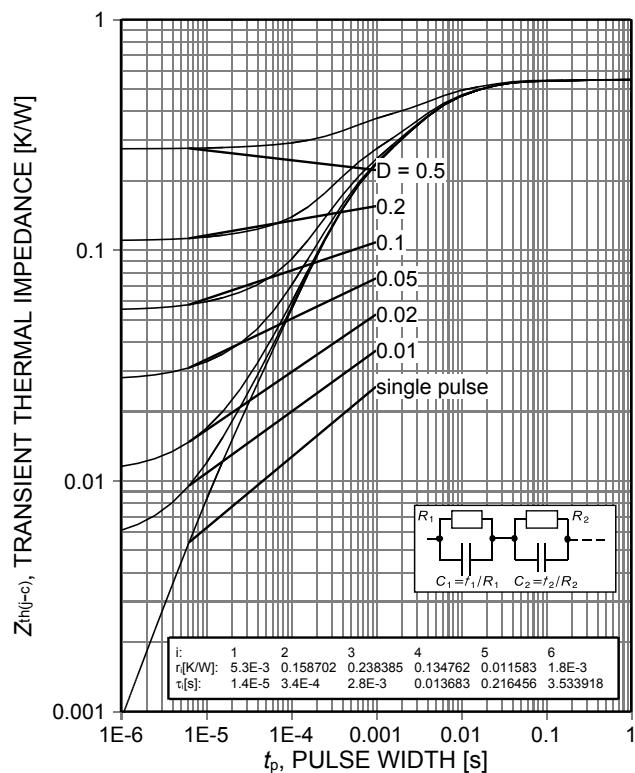
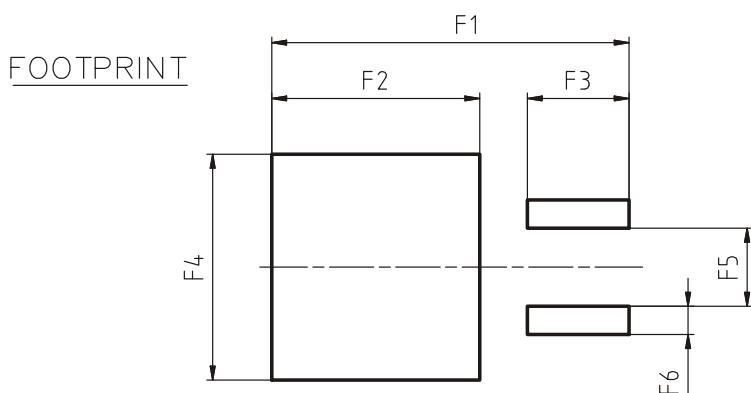
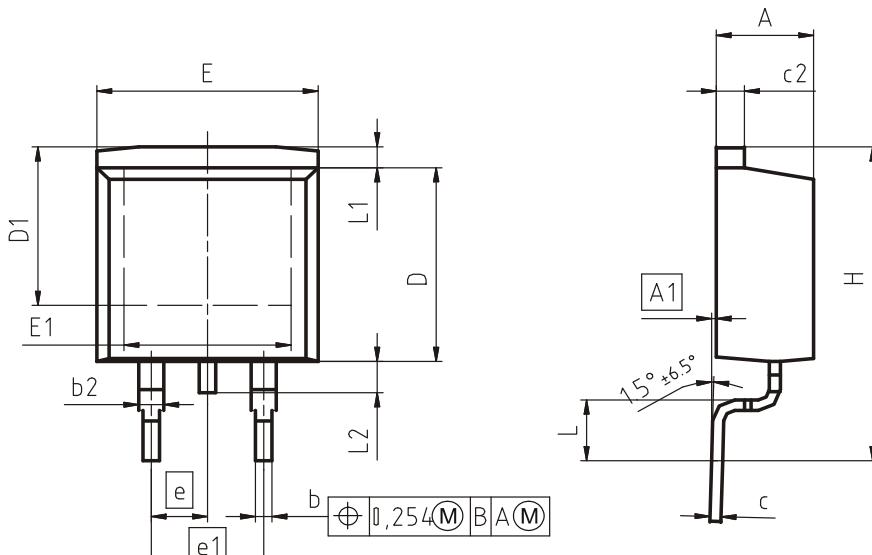


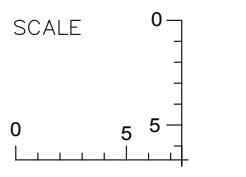
Figure 17. IGBT transient thermal impedance
($D=t_p/T$)

High speed switching series fifth generation

Package Drawing PG-TO263-3



DIM	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	4.30	4.57	0.169	0.180
A1	0.00	0.25	0.000	0.010
b	0.65	0.85	0.026	0.033
b2	0.95	1.15	0.037	0.045
c	0.33	0.65	0.013	0.026
c2	1.17	1.40	0.046	0.055
D	8.51	9.45	0.335	0.372
D1	7.10	7.90	0.280	0.311
E	9.80	10.31	0.386	0.406
E1	6.50	8.60	0.256	0.339
e	2.54		0.100	
e1	5.08		0.200	
N	2		2	
H	14.61	15.88	0.575	0.625
L	2.29	3.00	0.090	0.118
L1	0.70	1.60	0.028	0.063
L2	1.00	1.78	0.039	0.070
F1	16.05	16.25	0.632	0.640
F2	9.30	9.50	0.366	0.374
F3	4.50	4.70	0.177	0.185
F4	10.70	10.90	0.421	0.429
F5	3.65	3.85	0.144	0.152
F6	1.25	1.45	0.049	0.057

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Testing Conditions

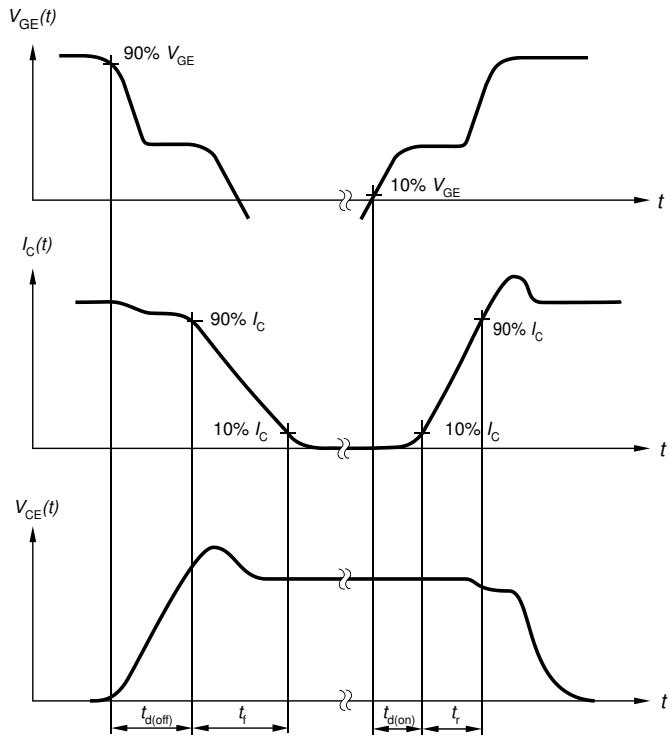


Figure A. Definition of switching times

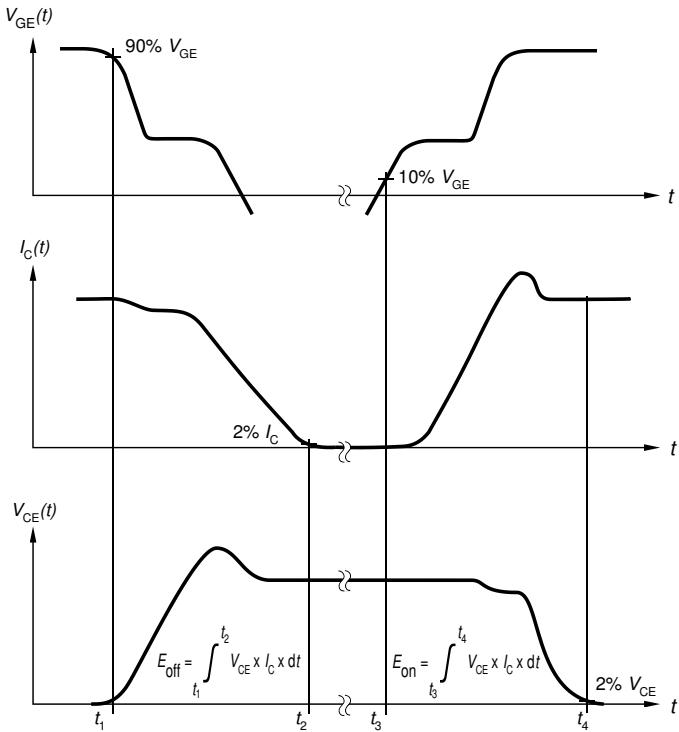


Figure B. Definition of switching losses

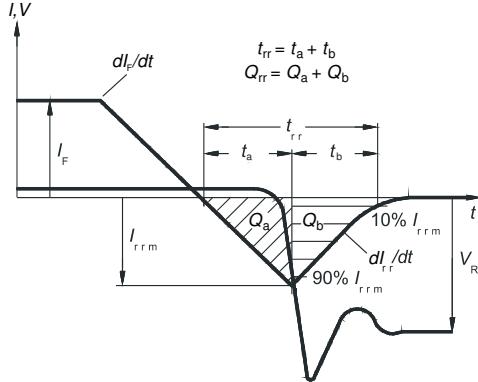


Figure C. Definition of diode switching characteristics

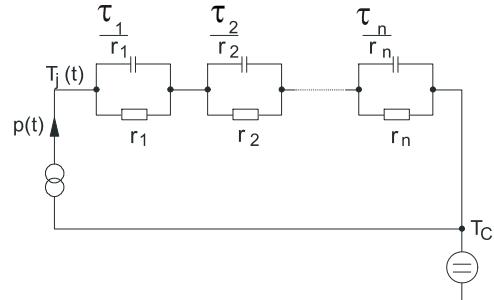


Figure D. Thermal equivalent circuit

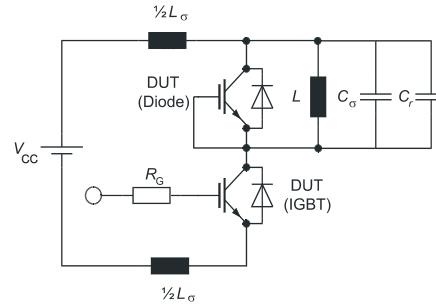


Figure E. Dynamic test circuit
 Parasitic inductance L_σ ,
 parasitic capacitor C_σ ,
 relief capacitor C_r ,
 (only for ZVT switching)

High speed switching series fifth generation**Revision History**

IGB50N65S5

Revision: 2018-01-11, Rev. 2.2

Previous Revision

Revision	Date	Subjects (major changes since last revision)
2.1	2017-05-19	Final data sheet
2.2	2018-01-11	Remove of Pb-free symbol and editorial changes.

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ООО "ЛайфЭлектроникс"

"LifeElectronics" LLC

ИНН 7805602321 КПП 780501001 Р/С 40702810122510004610 ФАКБ "АБСОЛЮТ БАНК" (ЗАО) в г.Санкт-Петербурге К/С 30101810900000000703 БИК 044030703

Компания «Life Electronics» занимается поставками электронных компонентов импортного и отечественного производства от производителей и со складов крупных дистрибуторов Европы, Америки и Азии.

С конца 2013 года компания активно расширяет линейку поставок компонентов по направлению коаксиальный кабель, кварцевые генераторы и конденсаторы (керамические, пленочные, электролитические), за счёт заключения дистрибуторских договоров

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- Конкурентоспособные цены и скидки постоянным клиентам.
- Специальные условия для постоянных клиентов.
- Подбор аналогов.
- Поставку компонентов в любых объемах, удовлетворяющих вашим потребностям.
- Приемлемые сроки поставки, возможна ускоренная поставка.
- Доставку товара в любую точку России и стран СНГ.
- Комплексную поставку.
- Работу по проектам и поставку образцов.
- Формирование склада под заказчика.
- Сертификаты соответствия на поставляемую продукцию (по желанию клиента).
- Тестирование поставляемой продукции.
- Поставку компонентов, требующих военную и космическую приемку.
- Входной контроль качества.
- Наличие сертификата ISO.

В составе нашей компании организован Конструкторский отдел, призванный помочь разработчикам, и инженерам.

Конструкторский отдел помогает осуществить:

- Регистрацию проекта у производителя компонентов.
- Техническую поддержку проекта.
- Защиту от снятия компонента с производства.
- Оценку стоимости проекта по компонентам.
- Изготовление тестовой платы монтаж и пусконаладочные работы.



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