



# BUL128D-B

## HIGH VOLTAGE FAST-SWITCHING NPN POWER TRANSISTOR

- n STMicroelectronics PREFERRED SALES TYPE
- n NPN TRANSISTOR
- n HIGH VOLTAGE CAPABILITY
- n LOW SPREAD OF DYNAMIC PARAMETERS
- n MINIMUM LOT-TO-LOT SPREAD FOR RELIABLE OPERATION
- n VERY HIGH SWITCHING SPEED
- n INTEGRATED ANTIPARALLEL COLLECTOR- EMITTER DIODE

### APPLICATIONS

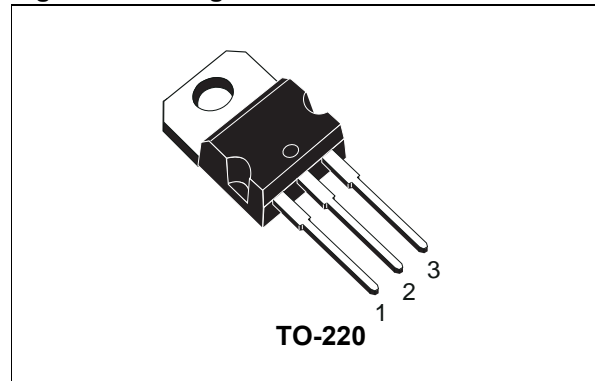
- n ELECTRONIC BALLAST FOR FLUORESCENT LIGHTING
- n FLYBACK AND FORWARD SINGLE TRANSISTOR LOW POWER CONVERTERS

### DESCRIPTION

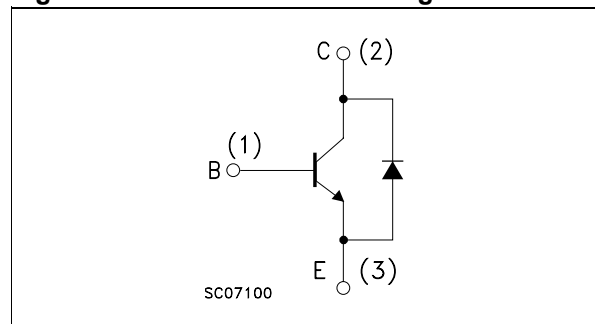
The device is manufactured using high voltage Multi Epitaxial Planar technology for high switching speeds and medium voltage capability. It uses a Cellular Emitter structure with planar edge termination to enhance switching speeds while maintaining the wide RBSOA.

The device is designed for use in lighting applications and low cost switch-mode power supplies.

**Figure 1: Package**



**Figure 2: Internal Schematic Diagram**



**Table 1: Order Codes**

Part Number	Marking	Package	Packaging
BUL128D-B	BUL128D-B	TO-220	Tube

**Table 2: Absolute Maximum Ratings**

Symbol	Parameter	Value	Unit
$V_{CES}$	Collector-Emitter Voltage ( $V_{BE} = 0$ )	700	V
$V_{CEO}$	Collector-Emitter Voltage ( $I_B = 0$ )	400	V
$V_{EBO}$	Emitter-Base Voltage ( $I_C = 0$ , $I_B = 2$ A, $t_p < 10$ $\mu$ s, $T_J = 150$ °C)	$V_{(BR)EBO}$	V
$I_C$	Collector Current	4	A
$I_{CM}$	Collector Peak Current ( $t_p < 5$ ms)	8	A
$I_B$	Base Current	2	A
$I_{BM}$	Base Peak Current ( $t_p < 5$ ms)	4	A

## BUL128D-B

Symbol	Parameter	Value	Unit
$P_{tot}$	Total Dissipation at $T_C = 25\text{ °C}$	70	W
$T_{stg}$	Storage Temperature	-65 to 150	°C
$T_J$	Max. Operating Junction Temperature	150	°C

**Table 3: Thermal Data**

$R_{thj-case}$	Thermal Resistance Junction-Case	Max	1.78	°C/W
$R_{thj-amb}$	Thermal Resistance Junction-Ambient	Max	62.5	°C/W

**Table 4: Electrical Characteristics ( $T_{case} = 25\text{ °C}$  unless otherwise specified)**

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
$I_{CES}$	Collector Cut-off Current ( $V_{BE} = 0\text{ V}$ )	$V_{CE} = 700\text{ V}$			100	$\mu\text{A}$
		$V_{CE} = 700\text{ V}$ $T_J = 125\text{ °C}$			500	$\mu\text{A}$
$I_{CEO}$	Collector Cut-off Current ( $I_B = 0$ )	$V_{CE} = 400\text{ V}$			250	$\mu\text{A}$
$V_{(BR)EBO}$	Emitter-Base Breakdown Voltage ( $I_C = 0$ )	$I_E = 10\text{ mA}$	9		18	V
$V_{CEO(sus)}^*$	Collector-Emitter Sustaining Voltage ( $I_B = 0$ )	$I_C = 100\text{ mA}$ $L = 25\text{ mH}$	400			V
$V_{CE(sat)}^*$	Collector-Emitter Saturation Voltage	$I_C = 0.5\text{ A}$ $I_B = 0.1\text{ A}$			0.7	V
		$I_C = 1\text{ A}$ $I_B = 0.2\text{ A}$			1	V
		$I_C = 2.5\text{ A}$ $I_B = 0.5\text{ A}$			1.5	V
		$I_C = 4\text{ A}$ $I_B = 1\text{ A}$		0.5		V
$V_{BE(sat)}^*$	Base-Emitter Saturation Voltage	$I_C = 0.5\text{ A}$ $I_B = 0.1\text{ A}$			1.1	V
		$I_C = 1\text{ A}$ $I_B = 0.2\text{ A}$			1.2	V
		$I_C = 2.5\text{ A}$ $I_B = 0.5\text{ A}$			1.3	V
$h_{FE}^*$	DC Current Gain	$I_C = 10\text{ mA}$ $V_{CE} = 5\text{ V}$	10			
		$I_C = 2\text{ A}$ $V_{CE} = 5\text{ V}$	12		32	
$t_s$ $t_f$	RESISTIVE LOAD	$V_{CC} = 200\text{ V}$ $I_C = 2\text{ A}$				
	Storage Time Fall Time	$I_{B1} = 0.4\text{ A}$ $V_{BE(off)} = -5\text{ V}$ $R_{BB} = 0\ \Omega$ $L = 200\ \mu\text{H}$ (see figure 15)		0.6 0.1		$\mu\text{s}$ $\mu\text{s}$
$t_s$ $t_f$	INDUCTIVE LOAD	$V_{CC} = 250\text{ V}$ $I_C = 2\text{ A}$				
	Storage Time Fall Time	$I_{B1} = 0.4\text{ A}$ $I_{B2} = -0.4\text{ A}$ $T_p = 30\ \mu\text{s}$ (see figure 14)	2	0.2	2.9	$\mu\text{s}$ $\mu\text{s}$

\* Pulsed: Pulsed duration =  $300\ \mu\text{s}$ , duty cycle  $\leq 1.5\%$ .

Figure 3: Safe Operating Area

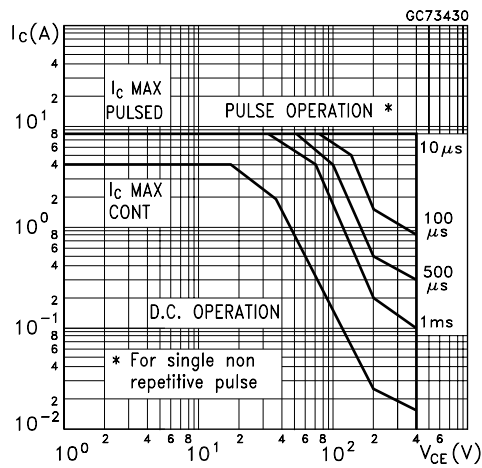


Figure 4: DC Current Gain

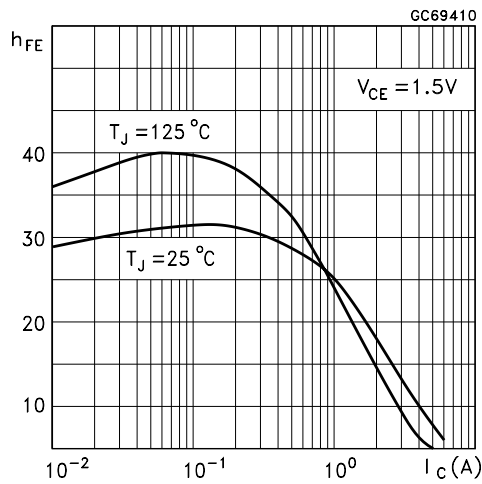


Figure 5: Collector-Emitter Saturation Voltage

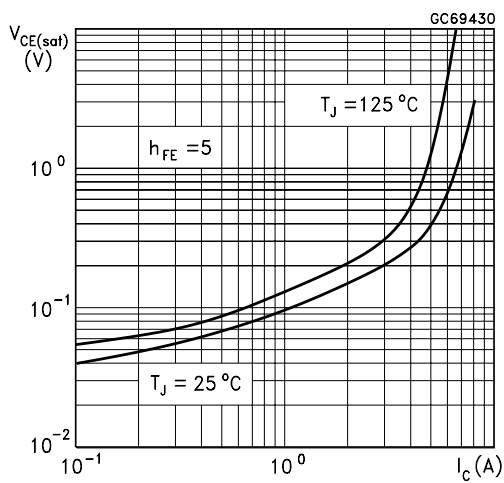


Figure 6: Derating Current

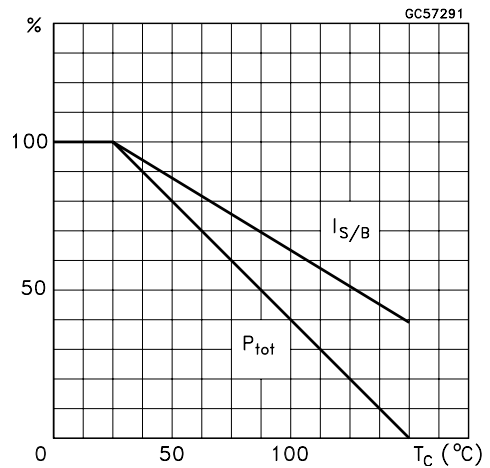


Figure 7: DC Current Gain

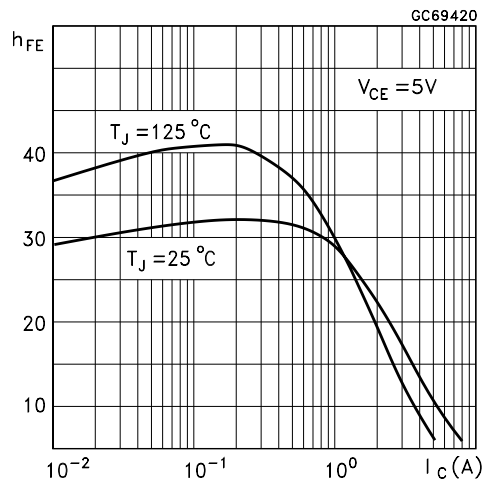


Figure 8: Base-Emitter Saturation Voltage

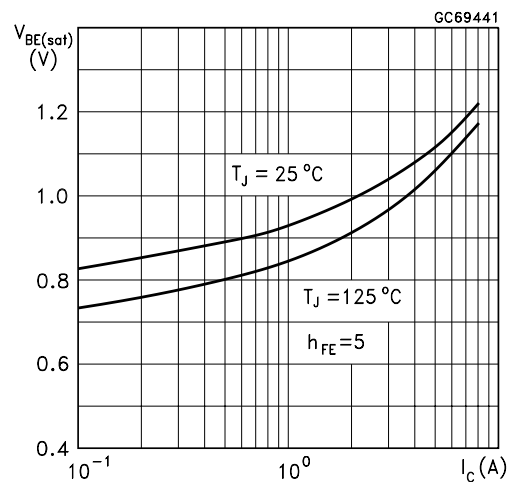


Figure 9: Inductive Load Fall Time

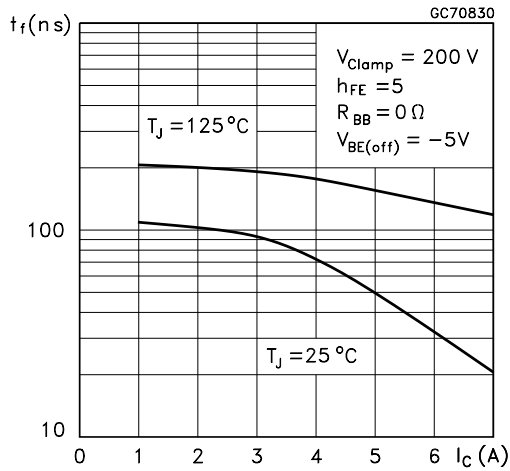


Figure 10: Resistive Load Fall Time

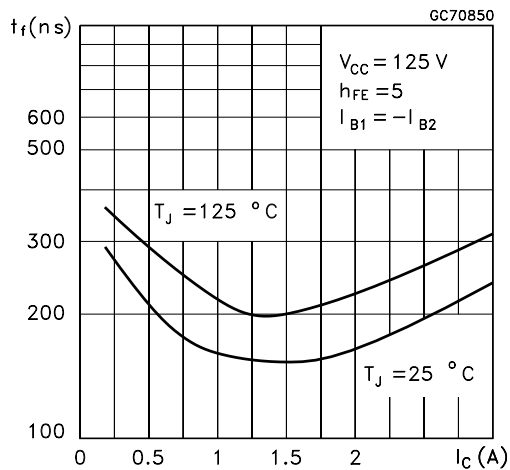


Figure 11: Reverse Biased Operating Area

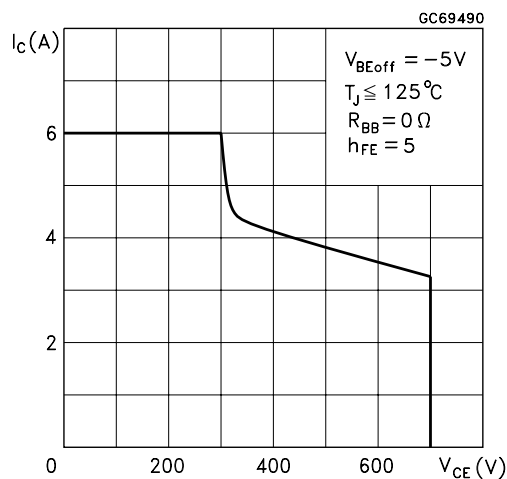


Figure 12: Inductive Load Storage Time

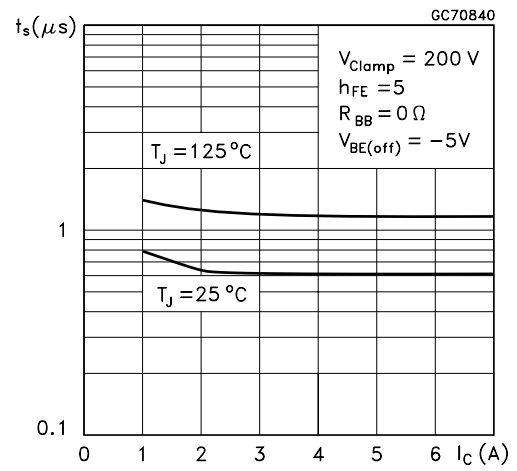


Figure 13: Resistive Load Storage Time

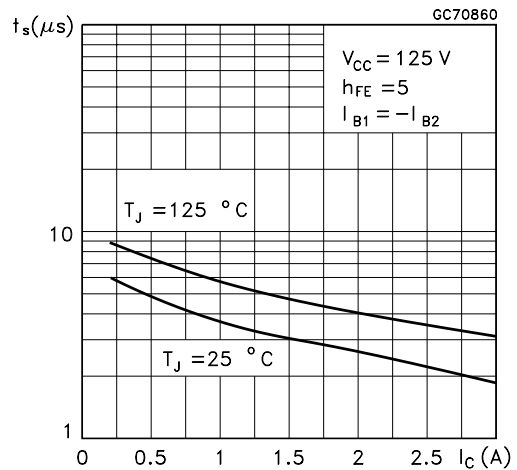


Figure 14: Inductive Load Switching Test Circuit

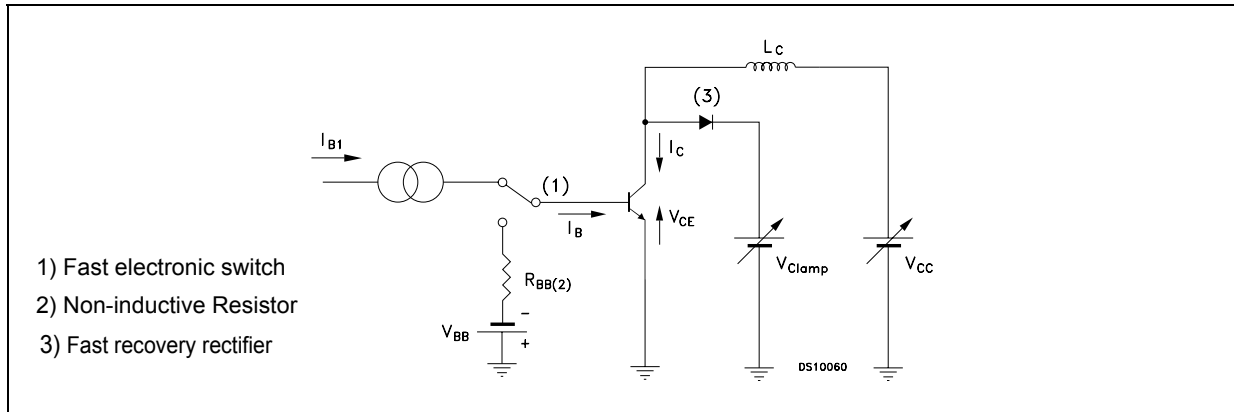
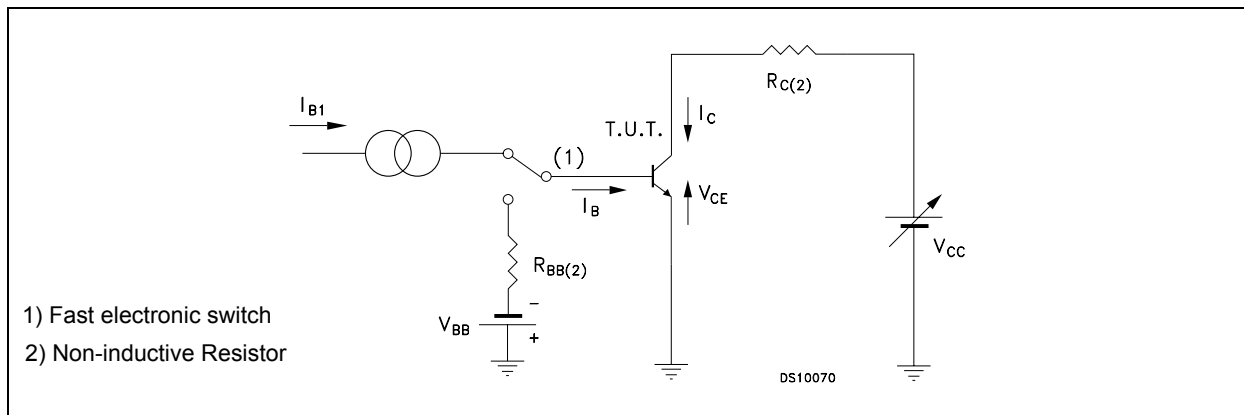
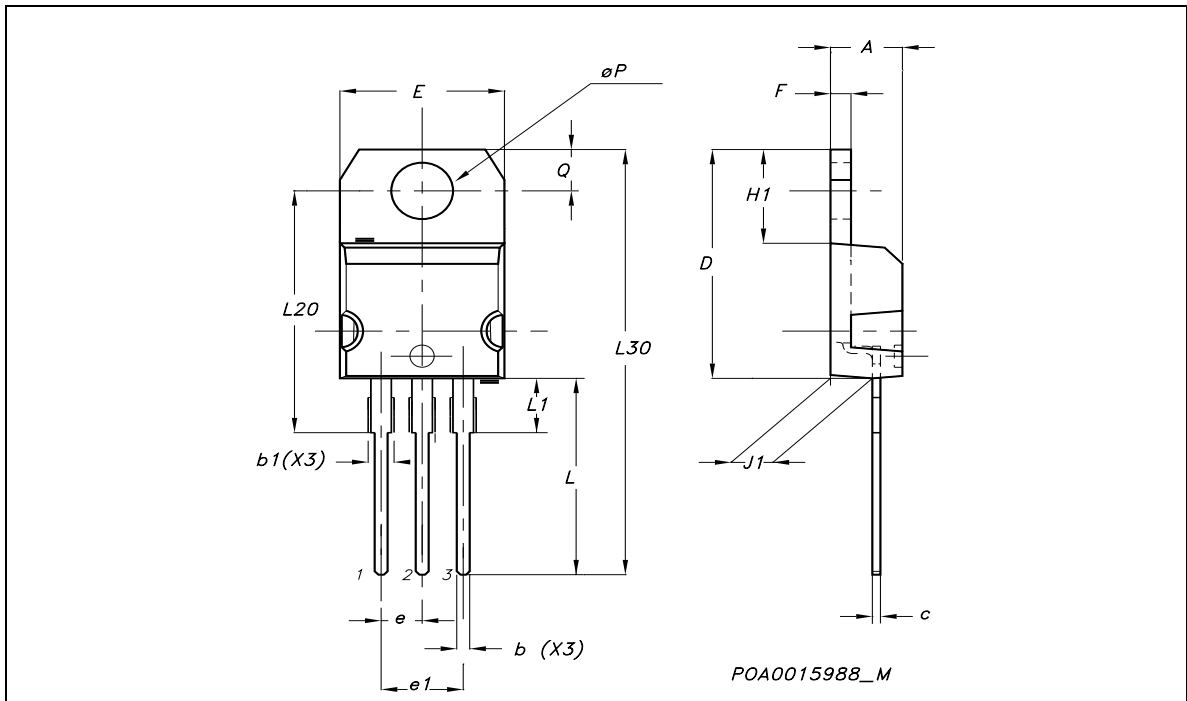


Table 15: Resistive Load Switching Test Circuit



**TO-220 MECHANICAL DATA**

DIM.	mm.			inch		
	MIN.	TYP.	MAX.	MIN.	TYP.	MAX.
A	4.40		4.60	0.173		0.181
b	0.61		0.88	0.024		0.034
b1	1.15		1.70	0.045		0.066
c	0.49		0.70	0.019		0.027
D	15.25		15.75	0.60		0.620
E	10		10.40	0.393		0.409
e	2.40		2.70	0.094		0.106
e1	4.95		5.15	0.194		0.202
F	1.23		1.32	0.048		0.052
H1	6.20		6.60	0.244		0.256
J1	2.40		2.72	0.094		0.107
L	13		14	0.511		0.551
L1	3.50		3.93	0.137		0.154
L20		16.40			0.645	
L30		28.90			1.137	
øP	3.75		3.85	0.147		0.151
Q	2.65		2.95	0.104		0.116



**Table 5:**

<b>Version</b>	<b>Release Date</b>	<b>Change Designator</b>
01-Oct-2002	1	First Release.
15-Feb-2005	1	Added table 1 on page 1.

Information furnished is believed to be accurate and reliable. However, STMicroelectronics assumes no responsibility for the consequences of use of such information nor for any infringement of patents or other rights of third parties which may result from its use. No license is granted by implication or otherwise under any patent or patent rights of STMicroelectronics. Specifications mentioned in this publication are subject to change without notice. This publication supersedes and replaces all information previously supplied. STMicroelectronics products are not authorized for use as critical components in life support devices or systems without express written approval of STMicroelectronics.

The ST logo is a registered trademark of STMicroelectronics  
All other names are the property of their respective owners

© 2005 STMicroelectronics - All Rights Reserved

STMicroelectronics group of companies

Australia - Belgium - Brazil - Canada - China - Czech Republic - Finland - France - Germany - Hong Kong - India - Israel - Italy - Japan -  
Malaysia - Malta - Morocco - Singapore - Spain - Sweden - Switzerland - United Kingdom - United States of America  
[www.st.com](http://www.st.com)





## Стандарт Электрон Связь

Мы молодая и активно развивающаяся компания в области поставок электронных компонентов. Мы поставляем электронные компоненты отечественного и импортного производства напрямую от производителей и с крупнейших складов мира.

Благодаря сотрудничеству с мировыми поставщиками мы осуществляем комплексные и плановые поставки широчайшего спектра электронных компонентов.

Собственная эффективная логистика и склад в обеспечивает надежную поставку продукции в точно указанные сроки по всей России.

Мы осуществляем техническую поддержку нашим клиентам и предпродажную проверку качества продукции. На все поставляемые продукты мы предоставляем гарантию .

Осуществляем поставки продукции под контролем ВП МО РФ на предприятия военно-промышленного комплекса России , а также работаем в рамках 275 ФЗ с открытием отдельных счетов в уполномоченном банке. Система менеджмента качества компании соответствует требованиям ГОСТ ISO 9001.

Минимальные сроки поставки, гибкие цены, неограниченный ассортимент и индивидуальный подход к клиентам являются основой для выстраивания долгосрочного и эффективного сотрудничества с предприятиями радиоэлектронной промышленности, предприятиями ВПК и научно-исследовательскими институтами России.

С нами вы становитесь еще успешнее!

### Наши контакты:

**Телефон:** +7 812 627 14 35

**Электронная почта:** [sales@st-electron.ru](mailto:sales@st-electron.ru)

**Адрес:** 198099, Санкт-Петербург,  
Промышленная ул, дом № 19, литера Н,  
помещение 100-Н Офис 331