

## IR21091(S) & (PbF)

### HALF-BRIDGE DRIVER

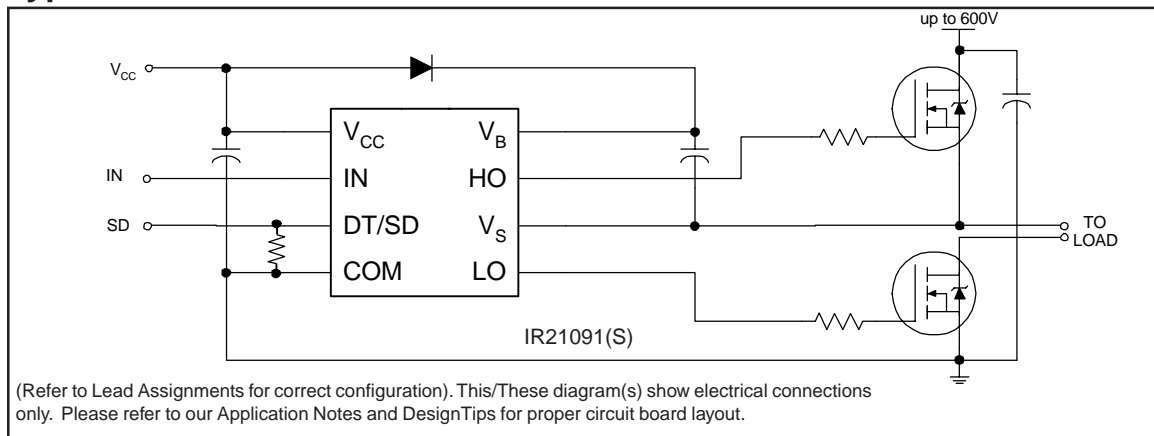
#### Features

- Floating channel designed for bootstrap operation  
 Fully operational to +600V  
 Tolerant to negative transient voltage  
 dV/dt immune
- Gate drive supply range from 10 to 20V
- Undervoltage lockout for both channels
- 3.3V, 5V and 15V input logic compatible
- Cross-conduction prevention logic
- Matched propagation delay for both channels
- High side output in phase with IN input
- Logic and power ground +/- 5V offset.
- Internal 500ns dead-time, and programmable up to 5us with one external R<sub>DT</sub> resistor
- Lower di/dt gate driver for better noise immunity
- The dual function DT/SD pin input turns off both channels.
- Available in Lead-Free

#### Description

The IR21091(S) are high voltage, high speed power MOSFET and IGBT drivers with dependant high and low side referenced output channels. Proprietary HVIC and latch immune CMOS technologies enable ruggedized monolithic construction. The logic input is compatible with standard CMOS or LSTTL output, down to 3.3V logic. The output drivers feature a high pulse current buffer stage designed for minimum driver cross-conduction. The floating channel can be used to drive an N-channel power MOSFET or IGBT in the high side configuration which operates up to 600 volts.

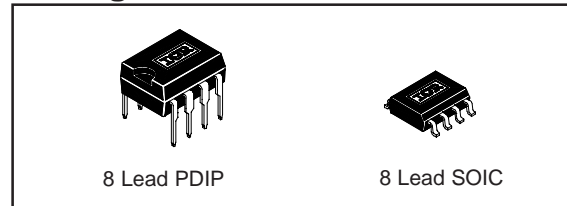
#### Typical Connection



#### Product Summary

V <sub>OFFSET</sub>	600V max.
I <sub>O+/-</sub>	120 mA / 250 mA
V <sub>OUT</sub>	10 - 20V
ton/off (typ.)	680 & 170 ns
Dead time (programmable up to 5uS)	500 ns

#### Packages



# IR21091(S) & (PbF)

## Absolute Maximum Ratings

Absolute maximum ratings indicate sustained limits beyond which damage to the device may occur. All voltage parameters are absolute voltages referenced to COM. The thermal resistance and power dissipation ratings are measured under board mounted and still air conditions.

Symbol	Definition	Min.	Max.	Units	
V <sub>B</sub>	High side floating absolute voltage	-0.3	625	V	
V <sub>S</sub>	High side floating supply offset voltage	V <sub>B</sub> - 25	V <sub>B</sub> + 0.3		
V <sub>HO</sub>	High side floating output voltage	V <sub>S</sub> - 0.3	V <sub>B</sub> + 0.3		
V <sub>CC</sub>	Low side and logic fixed supply voltage	-0.3	25		
V <sub>LO</sub>	Low side output voltage	-0.3	V <sub>CC</sub> + 0.3		
DT/SD	Programmable dead-time and shut-down pin voltage	V <sub>SS</sub> - 0.3	V <sub>CC</sub> + 0.3		
V <sub>IN</sub>	Logic input voltage	V <sub>SS</sub> - 0.3	V <sub>CC</sub> + 0.3		
dV <sub>S</sub> /dt	Allowable offset supply voltage transient	—	50	V/ns	
P <sub>D</sub>	Package power dissipation @ T <sub>A</sub> ≤ +25°C	(8 Lead PDIP)	—	1.0	W
		(8 Lead SOIC)	—	0.625	
R <sub>thJA</sub>	Thermal resistance, junction to ambient	(8 Lead PDIP)	—	125	°C/W
		(8 Lead SOIC)	—	200	
T <sub>J</sub>	Junction temperature	—	150	°C	
T <sub>S</sub>	Storage temperature	-50	150		
T <sub>L</sub>	Lead temperature (soldering, 10 seconds)	—	300		

## Recommended Operating Conditions

The input/output logic timing diagram is shown in figure 1. For proper operation the device should be used within the recommended conditions. The V<sub>S</sub> offset rating are tested with all supplies biased at 15V differential.

Symbol	Definition	Min.	Max.	Units
V <sub>B</sub>	High side floating supply absolute voltage	V <sub>S</sub> + 10	V <sub>S</sub> + 20	V
V <sub>S</sub>	High side floating supply offset voltage	Note 1	600	
V <sub>HO</sub>	High side floating output voltage	V <sub>S</sub>	V <sub>B</sub>	
V <sub>CC</sub>	Low side and logic fixed supply voltage	10	20	
V <sub>LO</sub>	Low side output voltage	0	V <sub>CC</sub>	
V <sub>IN</sub>	Logic input voltage	V <sub>SS</sub>	V <sub>CC</sub>	
DT/SD	Programmable dead-time and shut-down pin voltage	V <sub>SS</sub>	V <sub>CC</sub>	
T <sub>A</sub>	Ambient temperature	-40	125	°C

Note 1: Logic operational for V<sub>S</sub> of -5 to +600V. Logic state held for V<sub>S</sub> of -5V to -V<sub>BS</sub>. (Please refer to the Design Tip DT97-3 for more details).

## Dynamic Electrical Characteristics

$V_{BIAS}$  ( $V_{CC}$ ,  $V_{BS}$ ) = 15V,  $C_L$  = 1000 pF,  $T_A$  = 25°C, DT =  $V_{SS}$  unless otherwise specified.

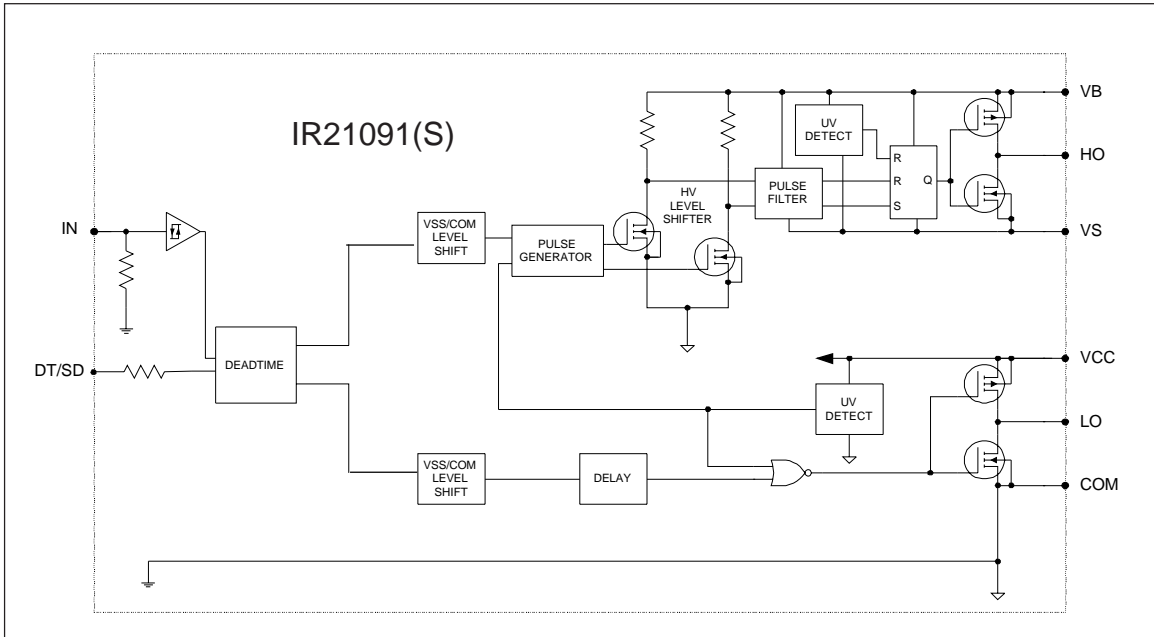
Symbol	Definition	Min.	Typ.	Max.	Units	Test Conditions
$t_{on}$	Turn-on propagation delay	—	750	950	nsec	$V_S = 0V$
$t_{off}$	Turn-off propagation delay	—	200	280		$V_S = 0V$ or 600V
MT	Delay matching, HS & LS turn-on/off	—	0	70		
$t_r$	Turn-on rise time	—	150	220	nsec	$V_S = 0V$
$t_f$	Turn-off fall time	—	50	80		$V_S = 0V$
DT	Deadtime: LO turn-off to HO turn-on(DT <sub>LO-HO</sub> ) & HO turn-off to LO turn-on (DT <sub>HO-LO</sub> )	400	540	680		RDT= 0
MDT	Deadtime matching = DT <sub>LO</sub> - HO - DT <sub>HO-LO</sub>	—	0	60	nsec	RDT=0
		—	0	600		RDT = 200k
tsd	Shut down propagation delay	215	—	615		

## Static Electrical Characteristics

$V_{BIAS}$  ( $V_{CC}$ ,  $V_{BS}$ ) = 15V, DT=  $V_{SS}$  and  $T_A$  = 25°C unless otherwise specified. The  $V_{IL}$ ,  $V_{IH}$  and  $I_{IN}$  parameters are referenced to  $V_{SS}$  /COM and are applicable to the respective input leads: IN and DT. The  $V_O$ ,  $I_O$  and  $R_{on}$  parameters are referenced to COM and are applicable to the respective output leads: HO and LO.

Symbol	Definition	Min.	Typ.	Max.	Units	Test Conditions
$V_{IH}$	Logic "1" input voltage for HO & logic "0" for LO	2.9	—	—	V	$V_{CC} = 10V$ to 20V
$V_{IL}$	Logic "0" input voltage for HO & logic "1" for LO	—	—	0.8		$V_{CC} = 10V$ to 20V
$V_{SD,TH}$	DT/SD pin shutdown input threshold	11.5	13	14.5		
$V_{OH}$	High level output voltage, $V_{BIAS} - V_O$	—	0.8	1.4	V	$I_O = 20$ mA
$V_{OL}$	Low level output voltage, $V_O$	—	0.3	0.6		$I_O = 20$ mA
$I_{LK}$	Offset supply leakage current	—	—	50	μA	$V_B = V_S = 600V$
$I_{QBS}$	Quiescent $V_{BS}$ supply current	20	60	150		$V_{IN} = 0V$ or 5V
$I_{QCC}$	Quiescent $V_{CC}$ supply current	0.4	1.0	1.6	mA	$V_{IN} = 0V$ or 5V RDT = 0
$I_{IN+}$	Logic "1" input bias current	—	5	20		$IN = 5V$ , $SD = 0V$
$I_{IN-}$	Logic "0" input bias current	—	1	2	μA	$IN = 0V$ , $SD = 5V$
$V_{CCUV+}$ $V_{BSUV+}$	$V_{CC}$ and $V_{BS}$ supply undervoltage positive going threshold	8.0	8.9	9.8		V
$V_{CCUV-}$ $V_{BSUV-}$	$V_{CC}$ and $V_{BS}$ supply undervoltage negative going threshold	7.4	8.2	9.0		
$V_{CCUVH}$ $V_{BSUVH}$	Hysteresis	0.3	0.7	—		
$I_{O+}$	Output high short circuit pulsed current	120	200	—	mA	$V_O = 0V$ , $PW \leq 10 \mu s$
$I_{O-}$	Output low short circuit pulsed current	250	350	—		$V_O = 15V$ , $PW \leq 10 \mu s$

## Functional Block Diagrams



## Lead Definitions

Symbol	Description
IN	Logic input for high and low side gate driver outputs (HO and LO), in phase with HO
DT/SD	Programmable dead-time lead, referenced to VSS. Disables input/output logic when tied to VCC
V <sub>B</sub>	High side floating supply
HO	High side gate drive output
V <sub>S</sub>	High side floating supply return
V <sub>CC</sub>	Low side and logic fixed supply
LO	Low side gate drive output
COM	Low side return

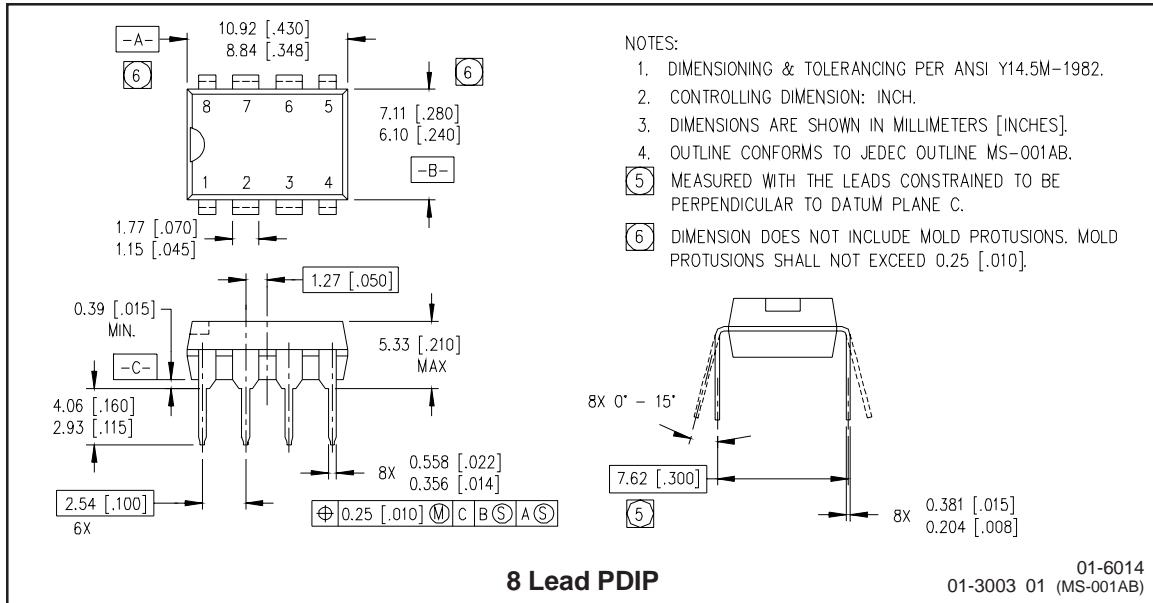
## Lead Assignments

<p>8 Lead PDIP</p>	<p>8 Lead SOIC</p>
<b>IR21091</b>	<b>IR21091(S)</b>

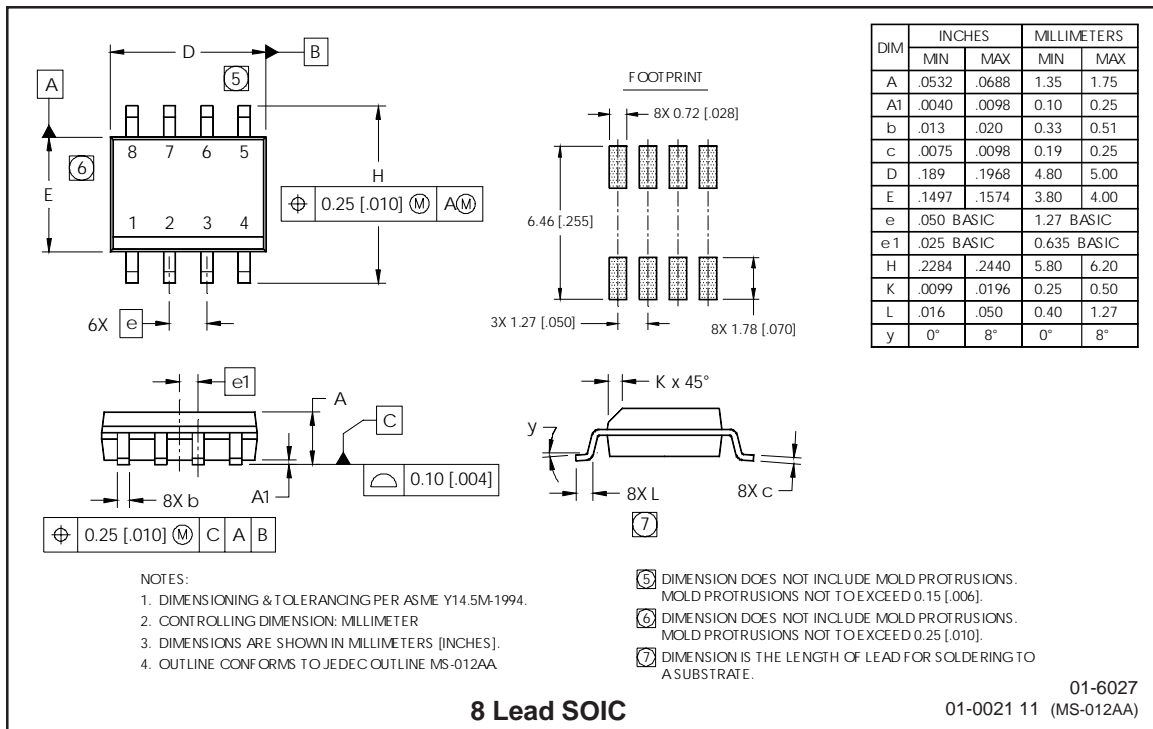
# IR21091(S) & (PbF)

International  
IR Rectifier

## Case Outlines



**8 Lead PDIP**



**8 Lead SOIC**

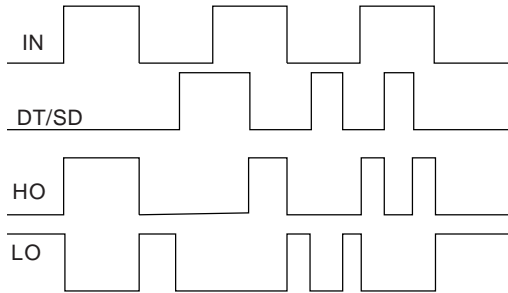


Figure 1. Input/Output Timing Diagram

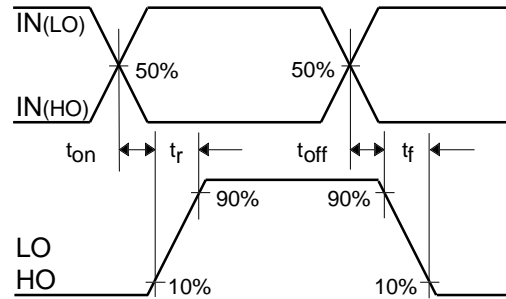


Figure 2. Switching Time Waveform Definitions

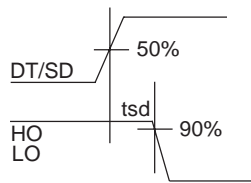


Figure 3. Shutdown Waveform Definitions

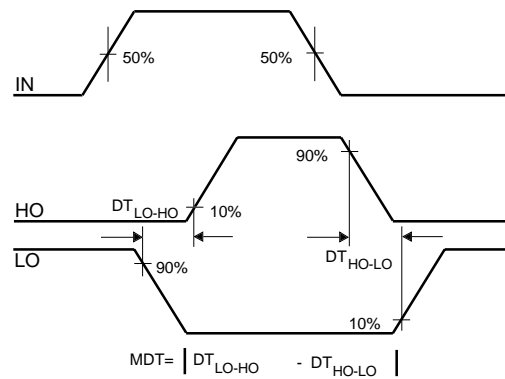


Figure 4. Deadtime Waveform Definitions

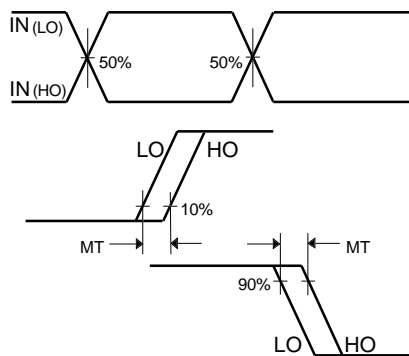
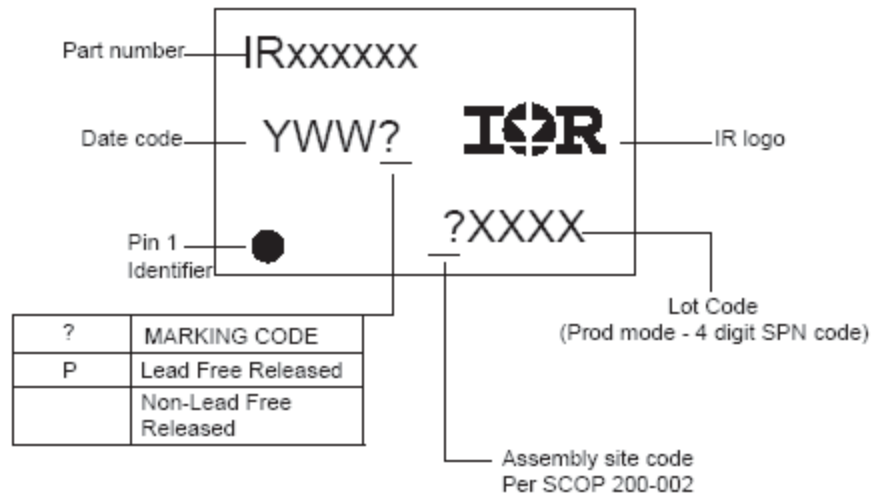


Figure 5. Delay Matching Waveform Definitions

# IR21091(S) & (PbF)

## LEADFREE PART MARKING INFORMATION



### Basic Part (Non-Lead Free)

8-Lead PDIP IR21091 order IR21091  
 8-Lead SOIC IR21091S order IR21091S

### Lead-Free Part

8-Lead PDIP IR21091 order IR21091PBF  
 8-Lead SOIC IR21091S order IR21091SPBF

This product has been designed and qualified for the Industrial market.  
 Qualification Standards can be found on IR's Website.  
 Data and specifications subject to change without notice.

**IR WORLD HEADQUARTERS:** 233 Kansas St., El Segundo, California 90245, USA Tel: (310) 252-7105  
 TAC Fax: (310) 252-7903  
 Visit us at [www.irf.com](http://www.irf.com) for sales contact information. 7/19/2005





Компания «ЭлектроПласт» предлагает заключение долгосрочных отношений при поставках импортных электронных компонентов на взаимовыгодных условиях!

Наши преимущества:

- Оперативные поставки широкого спектра электронных компонентов отечественного и импортного производства напрямую от производителей и с крупнейших мировых складов;
- Поставка более 17-ти миллионов наименований электронных компонентов;
- Поставка сложных, дефицитных, либо снятых с производства позиций;
- Оперативные сроки поставки под заказ (от 5 рабочих дней);
- Экспресс доставка в любую точку России;
- Техническая поддержка проекта, помощь в подборе аналогов, поставка прототипов;
- Система менеджмента качества сертифицирована по Международному стандарту ISO 9001;
- Лицензия ФСБ на осуществление работ с использованием сведений, составляющих государственную тайну;
- Поставка специализированных компонентов (Xilinx, Altera, Analog Devices, Intersil, Interpoint, Microsemi, Aeroflex, Peregrine, Syfer, Eurofarad, Texas Instrument, Miteq, Cobham, E2V, MA-COM, Hittite, Mini-Circuits, General Dynamics и др.);

Помимо этого, одним из направлений компании «ЭлектроПласт» является направление «Источники питания». Мы предлагаем Вам помощь Конструкторского отдела:

- Подбор оптимального решения, техническое обоснование при выборе компонента;
- Подбор аналогов;
- Консультации по применению компонента;
- Поставка образцов и прототипов;
- Техническая поддержка проекта;
- Защита от снятия компонента с производства.



#### Как с нами связаться

**Телефон:** 8 (812) 309 58 32 (многоканальный)

**Факс:** 8 (812) 320-02-42

**Электронная почта:** [org@eplast1.ru](mailto:org@eplast1.ru)

**Адрес:** 198099, г. Санкт-Петербург, ул. Калинина, дом 2, корпус 4, литера А.