

### FEATURES

- Available as "HR" (high reliability) screened per MIL-PRF-19500, JANTX level. Add "HR" suffix to base part number.
- Available as non-RoHS (Sn/Pb plating), standard, and as RoHS by adding "-PBF" suffix.

### MAXIMUM RATINGS

Characteristic	Symbol	2N3027 2N3030	2N3028 2N3031	2N3029 2N3032
Repetitive peak off-state voltage	$V_{DRM}$	30V	60V	100V
Repetitive peak reverse voltage	$V_{RRM}$	30V	60V	100V
DC on-state current 100°C case 75°C ambient	$I_T$		500mA 250mA	
Repetitive peak on-state current	$I_{TRM}$		30A	
Surge (non-repetitive) on-state current 50ms 8ms	$I_{TSM}$		5A 8A	
Peak gate current	$I_{GM}$		250mA	
Average gate current	$I_{G(AV)}$		25mA	
Reverse gate voltage	$V_{GR}$		5V	
Reverse gate current	$I_{GR}$		3mA	
Storage temperature range	$T_{stg}$		-65°C to +200°C	
Operating temperature range	$T_J$		-65°C to +150°C	

Blocking voltage ratings apply over the operating temperature range, provided the gate is connected to the cathode through an appropriate resistor, or adequate gate bias is used.

### ELECTRICAL CHARACTERISTIC (@ 25°C unless otherwise noted) (2N3027-2N3029)

Parameter	Symbol	Min.	Typ.	Max.	Unit	Test Condition
<b>25°C tests</b>						
Off state current	$I_{DRM}$	-	0.002	0.100	μA	$R_{GK} = 1K\Omega$ , $V_{DRM} = \text{rating}$
Reverse current	$I_{RRM}$	-	0.002	0.100	μA	$R_{GK} = 1K\Omega$ , $V_{RRM} = \text{rating}$
Reverse gate voltage	$V_{GR}$	5	8	-	V	$I_{GR} = 0.1mA$
Gate trigger current	$I_{GT}$	-5	8	200	μA	$R_{GS} = 10K\Omega$ , $V_D = 5V$
Gate trigger voltage	$V_{GT}$	0.400	0.550	0.800	V	$R_{GS} = 100\Omega$ , $V_D = 5V$
On-state voltage	$V_T$	0.800	1.200	1.500	V	$I_T = 1A$ (pulse test)
Holding current	$I_H$	0.300	0.700	5.000	mA	$R_{GK} = 1K\Omega$ , $V_D = 5V$
Off-state voltage – critical rate of rise	$dv/dt$	30 15 10	60 30 25	- - -	V/μs	$R_{GK} = 1K\Omega$ , $V_D = 30V$ (2N3027) $R_{GK} = 1K\Omega$ , $V_D = 60V$ (2N3028) $R_{GK} = 1K\Omega$ , $V_D = 100V$ (2N3029)
Gate trigger-on pulse width	$t_{pg(on)}$	-	0.070	0.200	μs	$I_G = 10mA$ , $I_T = 1A$ , $V_D = 30V$
Delay time	$t_d$	-	0.080	-	μs	$I_G = 10mA$ , $I_T = 1A$ , $V_D = 30V$
Rise time	$t_r$	-	0.040	-	μs	$I_G = 10mA$ , $I_T = 1A$ , $V_D = 30V$
Circuit commutated turn-off time	$t_g$	-	0.700	2.000	μs	$I_T = 1A$ , $I_R = 1A$ , $R_{GK} = 1K\Omega$

# 2N3027-2N3032

## SILICON CONTROLLED RECTIFIER

Parameter	Symbol	Min.	Typ.	Max.	Unit	Test Condition
<b>150°C Tests</b>						
High temperature off-state current	$I_{DRM}$	-	2	20	$\mu A$	$R_{GK} = 1K\Omega, V_{DRM} = \text{rating}$
High temperature reverse current	$I_{RRM}$	-	20	50	$\mu A$	$R_{GK} = 1K\Omega, V_{RRM} = \text{rating}$
High temperature gate trigger voltage	$V_{GT}$	0.100	0.150	0.600	V	$R_{GS} = 100\Omega, V_D = 5V$
High temperature holding current	$I_H$	0.050	0.200	1.000	mA	$R_{GK} = 1K\Omega, V_D = 5V$
<b>-65°C Tests</b>						
Low temperature gate trigger voltage	$V_{GT}$	0.600	0.750	1.100	V	$R_{GS} = 100\Omega, V_D = 5V$
Low temperature gate trigger current	$I_{GT}$	0	150	1.200	mA	$R_{GS} = 10K\Omega, V_D = 5V$
Low temperature holding current	$I_H$	0.500	3.500	10	mA	$R_{GK} = 1K\Omega, V_D = 5V$

### ELECTRICAL CHARACTERISTIC (@ 25°C unless otherwise noted) (2N3030-2N3032)

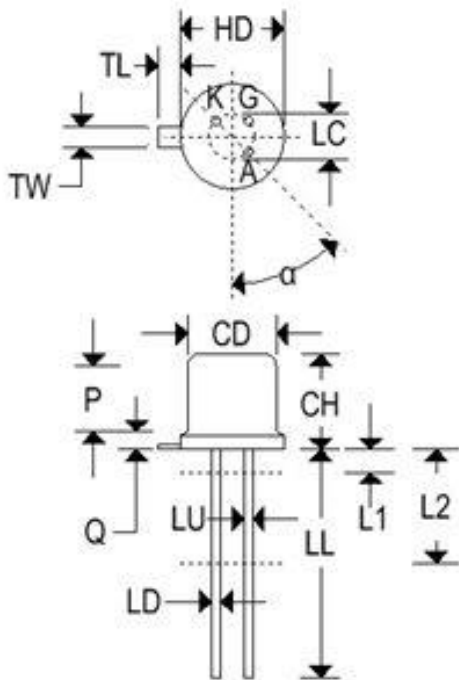
<b>25°C tests</b>						
Off state current	$I_{DRM}$	-	0.002	0.100	$\mu A$	$R_{GK} = 1K\Omega, V_{DRM} = \text{rating}$
Reverse current	$I_{RRM}$	-	0.002	0.100	$\mu A$	$R_{GK} = 1K\Omega, V_{RRM} = \text{rating}$
Reverse gate voltage	$V_{GR}$	5	8	-	V	$I_{GR} = 0.1mA$
Gate trigger current	$I_{GT}$	-5		20	$\mu A$	$R_{GS} = 10K\Omega, V_D = 5V$
Gate trigger voltage	$V_{GT}$	0.440		0.600	V	$R_{GS} = 100\Omega, V_D = 5V$
On-state voltage	$V_T$	0.800	1.200	1.500	V	$I_T = 1A$ (pulse test)
Holding current	$I_H$	0.300	1.000	4.000	mA	$R_{GK} = 1K\Omega, V_D = 5V$
Off-state voltage – critical rate of rise	$dv/dt$	30	60	-	$V/\mu s$	$R_{GK} = 1K\Omega, V_D = 30V$ (2N3030)
		15	30	-		$R_{GK} = 1K\Omega, V_D = 60V$ (2N3031)
		10	25	-		$R_{GK} = 1K\Omega, V_D = 100V$ (2N3032)
Gate trigger-on pulse width	$t_{pg(on)}$	-	0.050	0.100	$\mu s$	$I_G = 10mA, I_T = 1A, V_D = 30V$
Delay time	$t_d$	-	0.100	-	$\mu s$	$I_G = 10mA, I_T = 1A, V_D = 30V$
Rise time	$t_r$	-	0.050	-	$\mu s$	$I_G = 10mA, I_T = 1A, V_D = 30V$
Circuit commutated turn-off time	$t_g$	-	0.700	2.000	$\mu s$	$I_T = 1A, I_R = 1A, R_{GK} = 1K$
<b>150°C Tests</b>						
High temperature off-state current	$I_{DRM}$	-	2	20	$\mu A$	$R_{GK} = 1K\Omega, V_{DRM} = \text{rating}$
High temperature reverse current	$I_{RRM}$	-	20	50	$\mu A$	$R_{GK} = 1K\Omega, V_{RRM} = \text{rating}$
High temperature gate trigger voltage	$V_{GT}$	0.100	0.150	0.400	V	$R_{GS} = 100\Omega, V_D = 5V$
High temperature holding current	$I_H$	0.050	0.300	2.000	mA	$R_{GK} = 1K, V_D = 5V$
<b>-65°C Tests</b>						
Low temperature gate trigger voltage	$V_{GT}$	0.440	0.800	0.950	V	$R_{GS} = 100\Omega, V_D = 5V$
Low temperature gate trigger current	$I_{GT}$	0	0.400	0.500	mA	$R_{GS} = 10K\Omega, V_D = 5V$
Low temperature holding current	$I_H$	0.500	5.000	8	mA	$R_{GK} = 1K\Omega, V_D = 5V$

# 2N3027-2N3032

## SILICON CONTROLLED RECTIFIER

### MECHANICAL CHARACTERISTICS

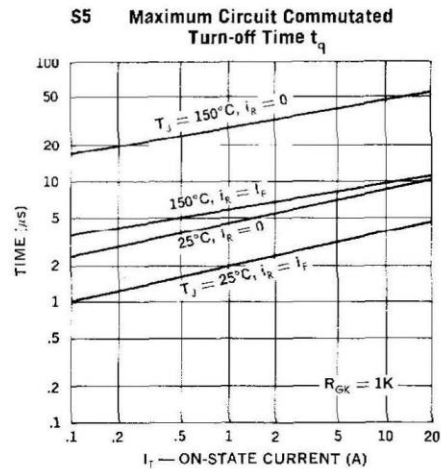
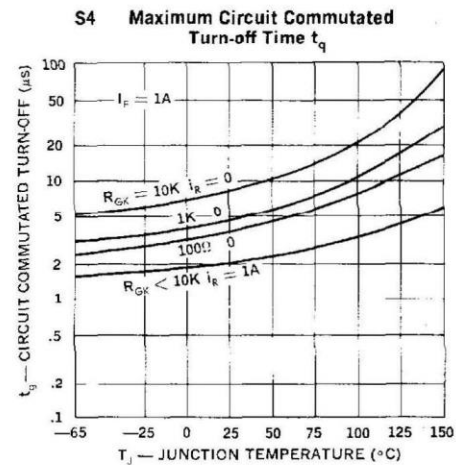
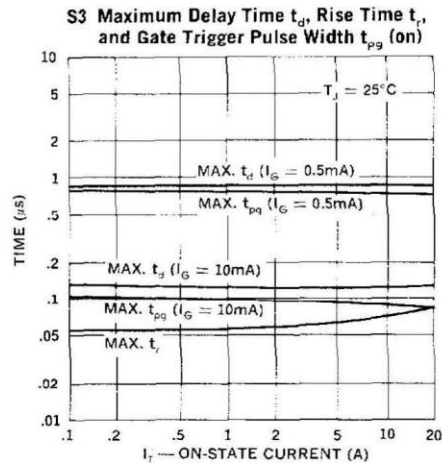
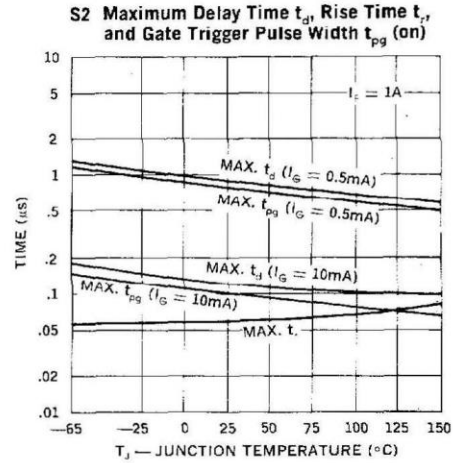
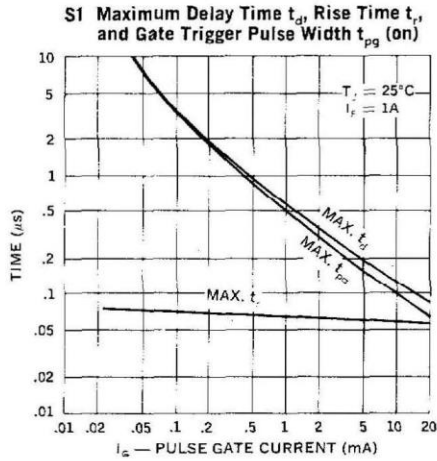
Case	TO-18
Marking	Alpha-numeric
Pin out	See below



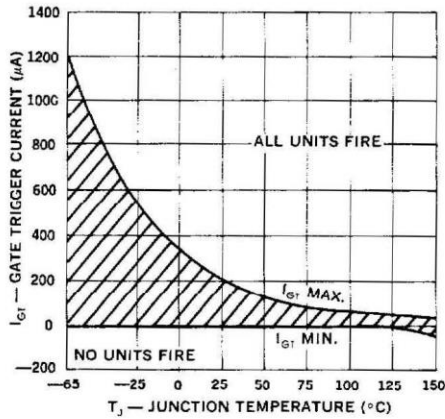
Dim	TO-18			
	Inches		Millimeters	
	Min	Max	Min	Max
CD	0.178	0.195	4.520	4.950
CH	0.170	0.210	4.320	5.330
HD	0.209	0.230	5.310	5.840
LC	0.100 TP		2.540 TP	
LD	0.016	0.021	0.410	0.530
LL	0.500	0.750	12.700	19.050
LU	0.016	0.019	0.410	0.480
L <sub>1</sub>	-	0.050	-	1.270
L <sub>2</sub>	0.250	-	6.350	-
P	0.100	-	2.540	-
Q	-	0.040	-	1.020
TL	0.028	0.048	0.710	1.220
TW	0.036	0.046	0.910	1.170
$\alpha$	45°TP		45°TP	

# 2N3027-2N3032

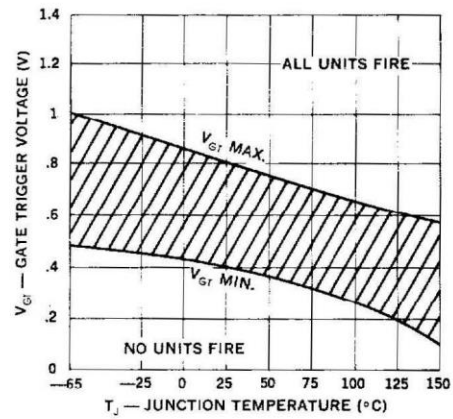
## SILICON CONTROLLED RECTIFIER



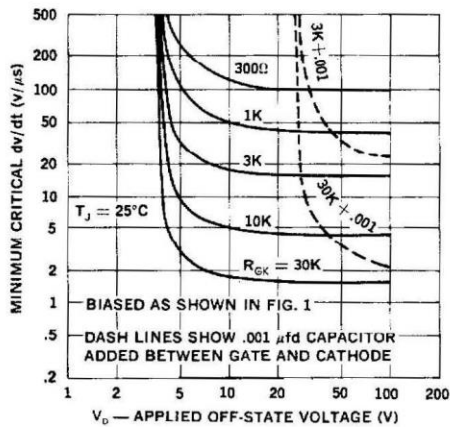
**1 Gate Trigger Current**



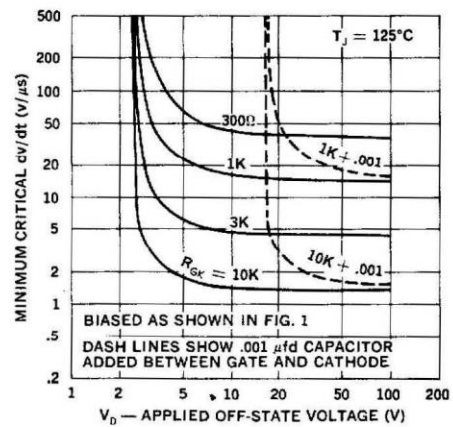
**2 Gate Trigger Voltage**



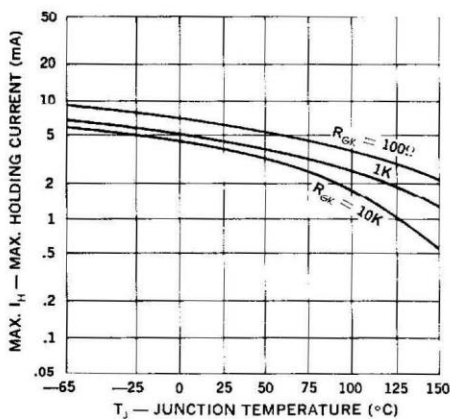
**3 Min. Critical dv/dt (25°C — R Bias)**



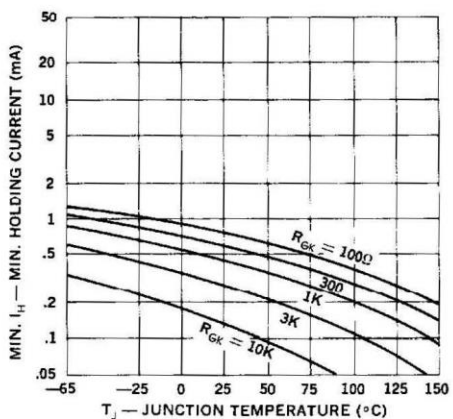
**4 Min. Critical dv/dt (125°C — R Bias)**



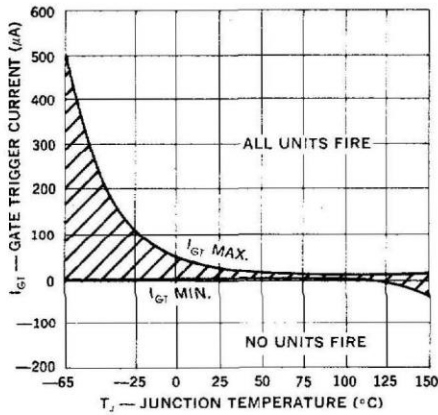
**5 Max. Holding Current (Resistor Bias)**



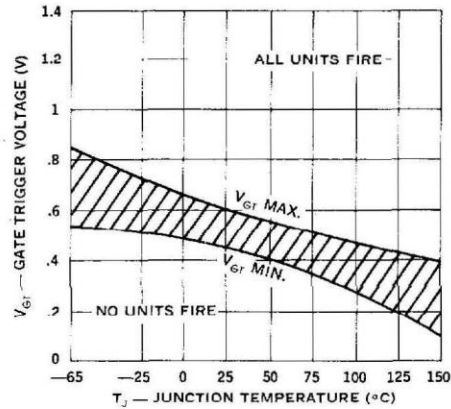
**6 Min. Holding Current (Resistor Bias)**



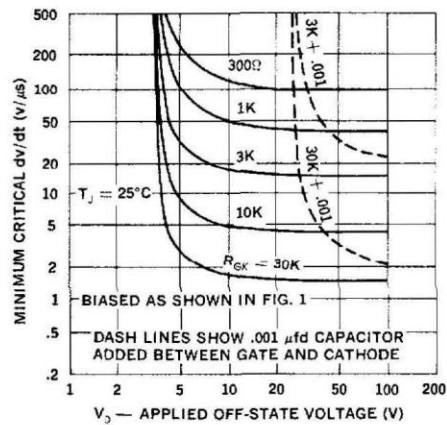
**1 Gate Trigger Current**



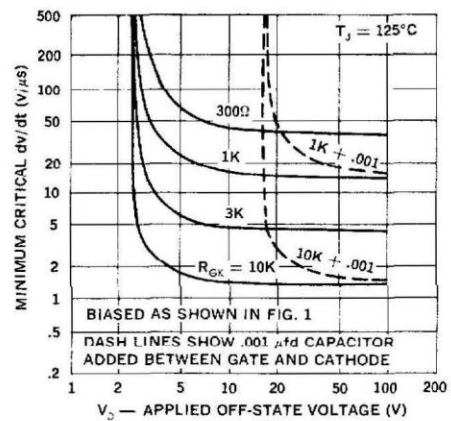
**2 Gate Trigger Voltage**



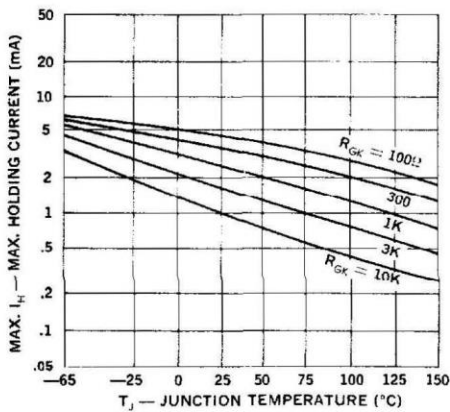
**3 Min. Critical dv/dt (25°C — R Bias)**



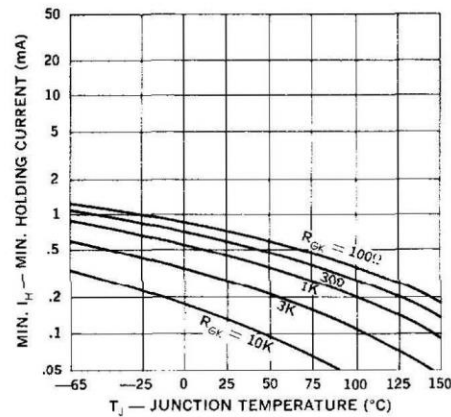
**4 Min. Critical dv/dt (125°C — R Bias)**



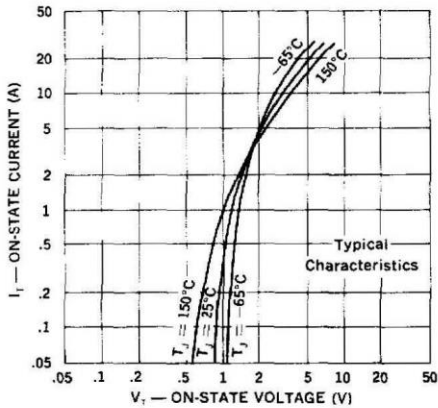
**5 Max. Holding Current (Resistor Bias)**



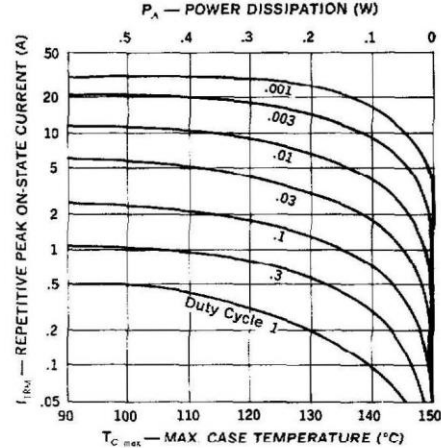
**6 Min. Holding Current (Resistor Bias)**



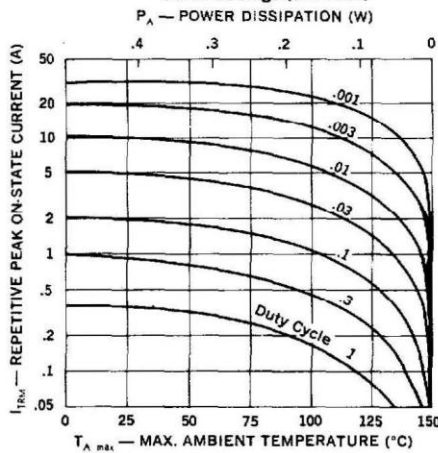
**C1 Forward on Current vs. Voltage**



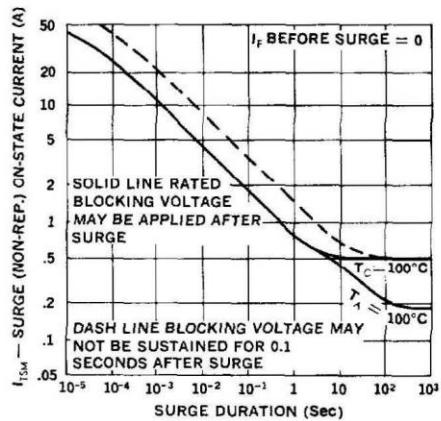
**C2 Peak Current vs. Case Temperature**



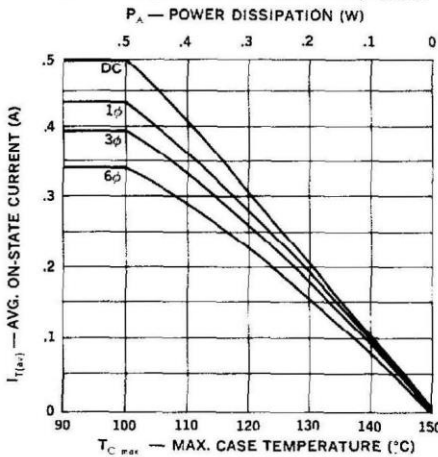
**C3 Peak Current vs. Ambient Temperature**  
TO-18 Ratings (see note)



**C4 Surge Current vs. Time**



**C5 Average Current vs. Case Temperature**



**C6 Average Current vs. Ambient Temperature**  
TO-18 Ratings (see note)

