Features

- **No External Components Except PIN Diode**
- **Supply-voltage Range: 4.5 V to 5.5 V**
- **Automatic Sensitivity Adaptation (AGC)**
- **Automatic Strong Signal Adaptation (ATC)**
- **Enhanced Immunity Against Ambient Light Disturbances**
- **Available for Carrier Frequencies between 30 kHz to 76 kHz; Adjusted by Zener Diode Fusing**
- **TTL and CMOS Compatible**
- **Suitable Minimum Burst Length ≥ 6 or 10 Pulses/Burst**

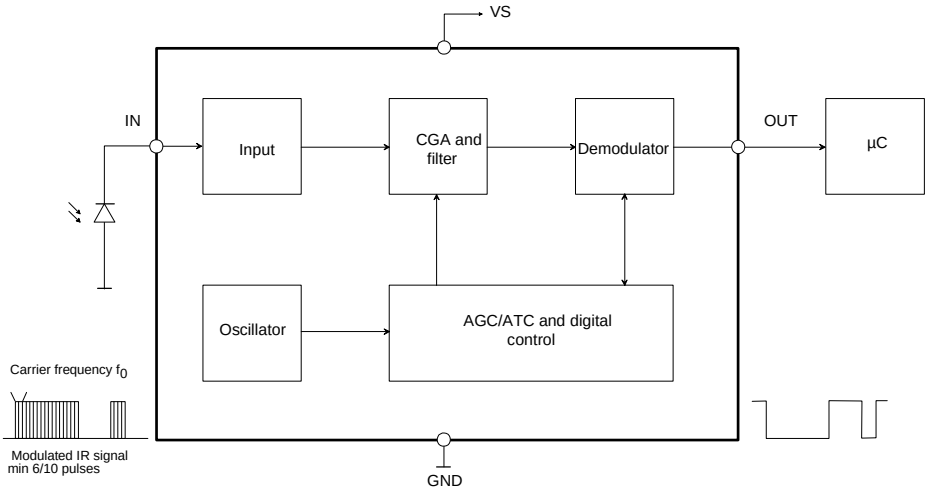
Applications

- **Audio Video Applications**
- **Home Appliances**
- **Remote Control Equipment**

Description

The IC T2525 is a complete IR receiver for data communication developed and optimized for use in carrier-frequency-modulated transmission applications. Its function can be described using the block diagram (see Figure 1). The input stage meets two main functions. First, it provides a suitable bias voltage for the PIN diode. Secondly, the pulsed photo-current signals are transformed into a voltage by a special circuit which is optimized for low-noise applications. After amplification by a **c**ontrolled **g**ain **a**mplifier (CGA), the signals have to pass a tuned integrated narrow bandpass filter with a center frequency f_0 which is equivalent to the chosen carrier frequency of the input signal. The demodulator is used to convert the input burst signal into a digital envelope output pulse and to evaluate the signal information quality, i.e., unwanted pulses will be suppressed at the output pin. All this is done by means of an integrated dynamic feedback circuit which varies the gain as a function of the present environmental condition (ambient light, modulated lamps etc.). Other special features are used to adapt to the current application to secure best transmission quality. The T2525 operates in a supply-voltage range of 4.5 V to 5.5 V.

Figure 1. Block Diagram



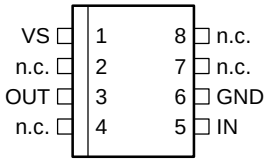
IR Receiver ASSP

T2525

Rev. 4657A–AUTO–01/03

Pin Configuration

Figure 2. Pinning SO8 and TSSOP8



Pin Description

Pin	Symbol	Function
1	VS	Supply voltage
2	n.c.	Not connected
3	OUT	Data output
4	n.c.	Not connected
5	IN	Input PIN-diode
6	GND	Ground
7	n.c.	Not connected
8	n.c.	Not connected

Absolute Maximum Ratings

Parameter	Symbol	Value	Unit
Supply voltage	V_S	-0.3 to +6	V
Supply current	I_S	3	mA
Input voltage	V_{IN}	-0.3 to V_S	V
Input DC current at V_S = 5 V	I_{IN}	0.75	mA
Output voltageV_O-0.3 to V_SV	V_O	-0.3 to V_S	V
Output current	I_O		mA
Operating temperature	T_{amb}		°C
Storage temperature	T_{stg}		°C
Power dissipation at T_{amb} = 25°C	P_{tot}	30	mW

Thermal Resistance

Parameter	Symbol	Value	Unit
Junction ambient SO8	R_{thJA}	130	k/W
Junction ambient TSSOP8	R_{thJA}	tbd	K/W

Electrical Characteristics

Tamb = -25 to 85°C, VS = 4.5 to 5.5 V unless otherwise specified.

No.	Parameters	Test Conditions	Pin	Symbol	Min.	Typ.	Max.	Unit	Type*
1	**Supply**								
1.1	Supply-voltage range		1	V_S	4.5	5	5.5	V	C
1.2	Supply current	I_{IN} =0	1	I_S	0.8	1.1	1.3	mA	B
2	**Output**								
2.1	Internal pull-up resistor [1)]	T_{amb} = 25°C; see Figure 9	1,3	R_{PU}		30/40		kW	A
2.2	Output voltage low	I_L = 2 mA; see Figure 9	3,6	V_{OL}			250	mV	B
2.3	Output voltage high		3,1	V_{OH}	V_S- 0.25		Vs	V	B
2.4	Output current clamping	R_2 = 0; see Figure 9	3,6	I_{OCL}		8		mA	B
3	**Input**								
3.1	Input DC current	V_{IN} = 0; see Figure 9	5	I_{IN_DCMAX}	-85			µA	C
3.2	Input DC-current; Figure 4	V_{IN} = 0; V_s = 5 V, T_{amb} = 25°C	5	I_{IN_DCMAX}	-530	-960		µA	B
3.3	Minimum detection threshold current; Figure 3	Test signal: see Figure 8 V_S = 5 V, T_{amb} = 25°C, I_{IN_DC} = 1µA; square pp, burst N = 16, f = f_0; t_{PER} = 10 ms, Figure 8; BER = 50[2)]	3	I_{Eemin}		-520		pA	B
3.4	Minimum detection threshold current with AC current disturbance IIN_AC100 = 3 µA at 100 Hz	Test signal: see Figure 8 V_S = 5 V, T_{amb} = 25°C, I_{IN_DC} = 1 µA, square pp, burst N = 16, f = f_0; t_{PER} = 10 ms, Figure 8; BER = 50%[2)]	3	I_{Eemin}		-800		pA	C

*) Type means: A =100% tested, B = 100% correlation tested, C = Characterized on samples, D = Design parameter

Note: 1. Depending on version, see “Ordering Information”

2. BER = bit error rate; e.g., BER = 5% means that with P = 20 at the input pin 19...21 pulses can appear at the Pin OUT
3. After transformation of input current into voltage

Electrical Characteristics (Continued)

Tamb = -25 to 85°C, VS = 4.5 to 5.5 V unless otherwise specified.

No.	Parameters	Test Conditions	Pin	Symbol	Min.	Typ.	Max.	Unit	Type*
3.5	Maximum detection threshold current with V_{IN} > 0V	Test signal: see Figure 8 V_S = 5V, T_{amb} = 25°C, I_{IN_DC} = 1µA; square pp, burst N = 16, f = f_0; t_{PER} = 10ms, Figure 8; BER = 5%[2)]	3	I_{Eemax}	-400			µA	D
4	**Controlled Amplifier and Filter**								
4.1	Maximum value of variable gain (CGA)			G_{VARMAX}		51		dB	D
4.2	Minimum value of variable gain (CGA)			G_{VARMIN}		-5		dB	D
4.3	Total internal amplification[3)]			G_{MAX}		71		dB	D
4.4	Center frequency fusing accuracy of bandpass	V_S = 5 V, T_{amb} = 25°C		f_{0_FUSE}	-3	f_0	+3	%	A
4.5	Overall accuracy center frequency of bandpass			f_0	-6.7	f_0	+4.1	%	C
4.6	BPF bandwidth: type N0 - N3 BPF bandwidth: type N6, N7	-3 dB; f_0 = 38 kHz; see Figure 6 -3 dB; f_0 = 38 kHz		B B		3.5 5.4		kHz kHz	C C

*) Type means: A =100% tested, B = 100% correlation tested, C = Characterized on samples, D = Design parameter

Note: 1. Depending on version, see “Ordering Information”

2. BER = bit error rate; e.g., BER = 5% means that with P = 20 at the input pin 19...21 pulses can appear at the Pin OUT
3. After transformation of input current into voltage

ESD All pins ⇒ 2000V HBM; 200V MM, MIL-STD-883C, Method 3015.7

Reliability Electrical qualification (1000h) in molded S08 plastic package

Typical Electrical Curves at T_{amb} = 25°C

Figure 3. I_{Eemin} versus I_{IN_DC} , V_S = 5 V

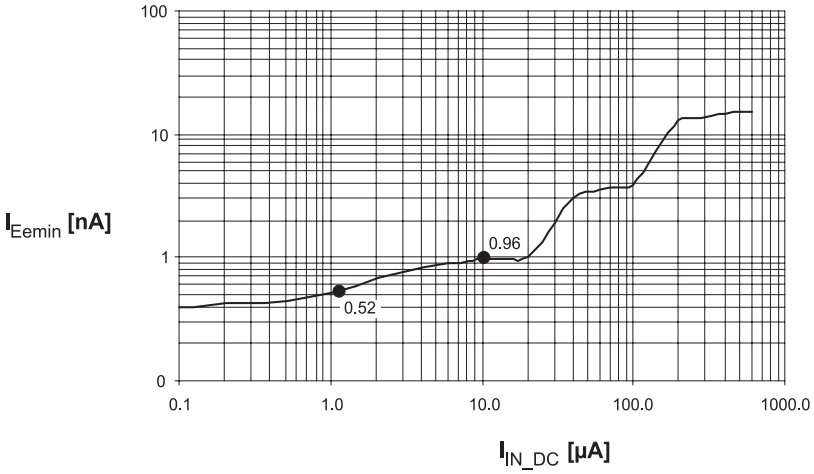


Figure 4. V_{IN} versus I_{IN_DC}, V_S = 5 V

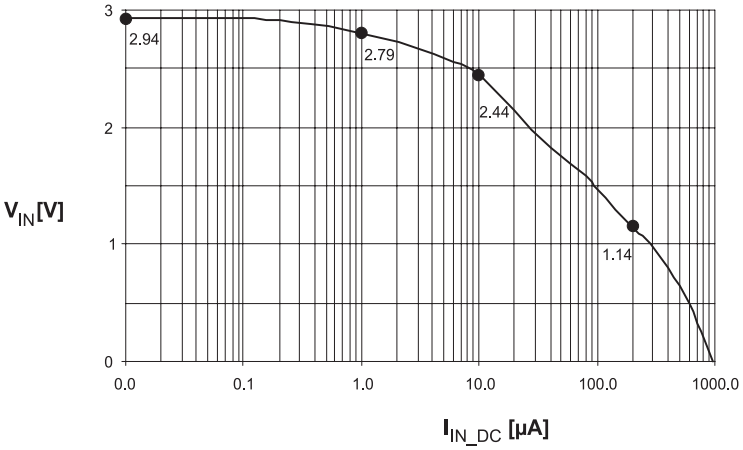


Figure 5. Data Transmission Rate, V_S = 5 V

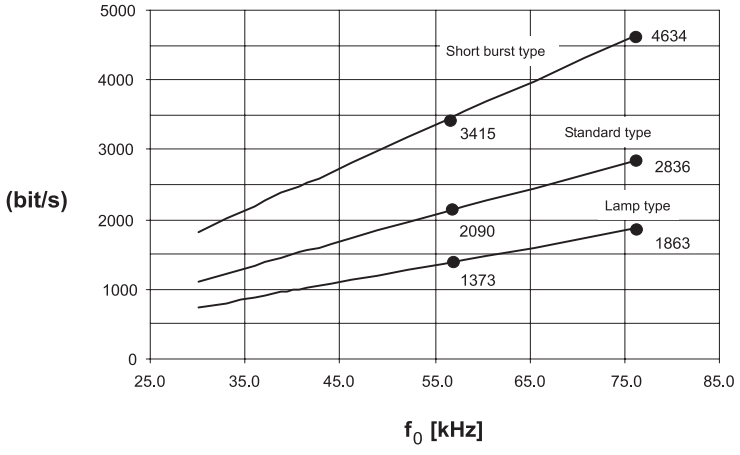
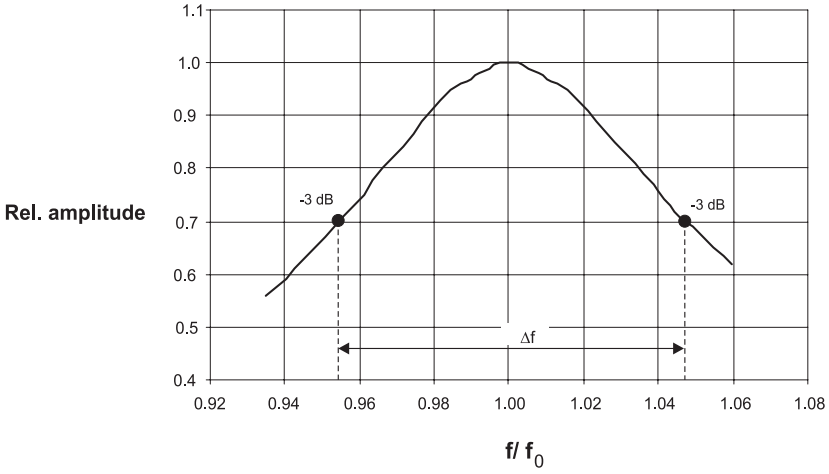
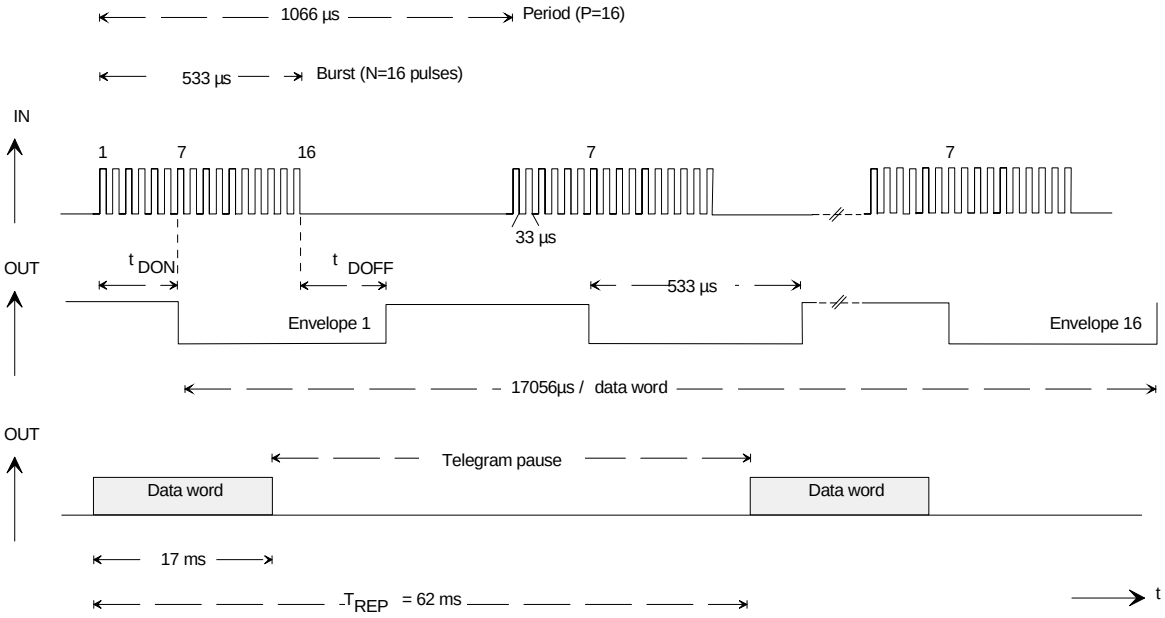


Figure 6. Typical Bandpass Curve



$Q = f_0/\Delta f$; Δf = -3 dB values. Example: Q = 1/ (1.047 - 0.954) = 11

Figure 7. Illustration of Used Terms



Example: f = 30 kHz, burst with 16 pulses, 16 periods

Figure 8. Test Circuit

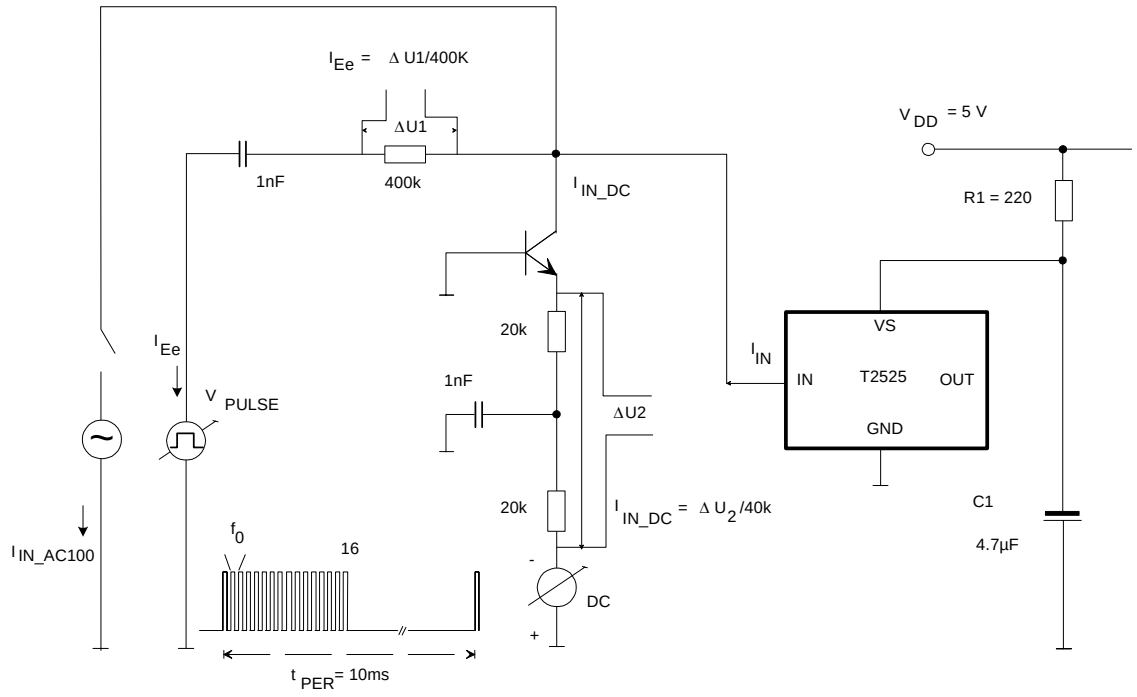
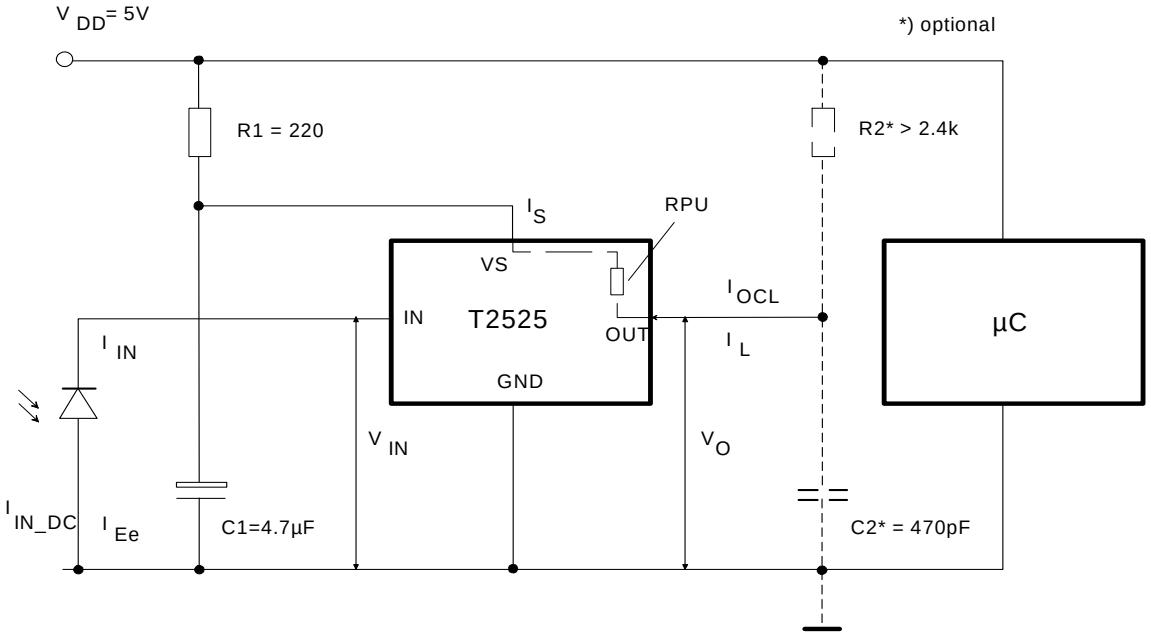
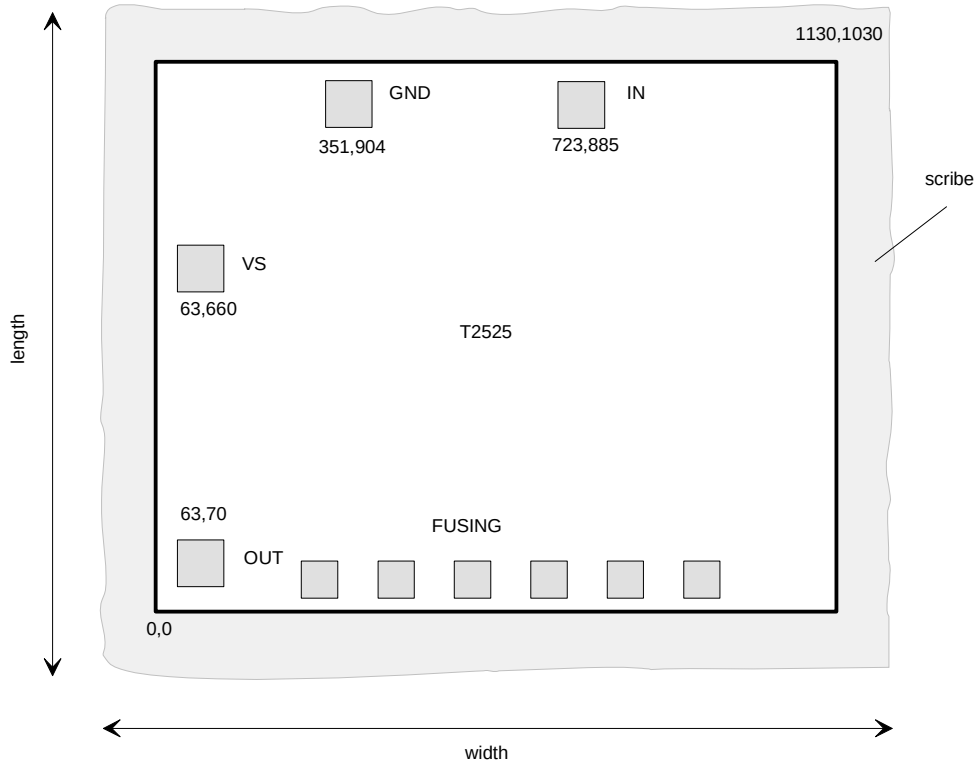


Figure 9. Application Circuit



Chip Dimensions

Figure 10. Chip Size in µm



Note: Pad coordinates are for lower left corner of the pad in µm from the origin 0,0

Dimensions	Length incl. scribe	1.15 mm
	Width incl. scribe	1.29 mm
	Thickness	290 µ ± 5%
	Pads	90 µ x 90 µ
	Fusing pads	70 µ x 70 µ
Pad metallurgy	AlSiTi	
Finish	Si_3N_4 thickness 1.05 µm	

Ordering Information

Extended Type Number	PL[2)]	R_{PU}[3)]	D[4)]	Type
T2525N0xx[1)]-yyy[5)]	2	30	2090	**Standard type:** ≥ 10 pulses, enhanced sensibility, high data rate
T2525N1xx[1)]-DDW	1	30	2090	**Standard type:** ≥ 10 pulses, enhanced sensibility, high data rate
T2525N2xx[1)]-yyy[5]	2	40	1373	**Lamp type:** ≥ 10 pulses, enhanced suppression of disturbances, secure data transmission
T2525N3xx[1)]-DDW	1	40	1373	**Lamp type:** ≥ 10 pulses, enhanced suppression of disturbances, secure data transmission
T2525N6xx[1)]-yyy[5]	2	30	3415	**Short burst type:** ≥ 6 pulses, enhanced data rate
T2525N7xx[1)]-DDW	1	30	3415	**Short burst type:** ≥ 6 pulses, enhanced data rate

Note:
1. xx means the used carrier frequency value f_0 30,33,36,38,40,44 ,56 kHz.(76 kHz type on request)
2. Two pad layout versions (see Figure 11 and Figure 12) available for different assembly demand
3. Integrated pull-up resistor at PIN OUT (see electrical characteristics)
4. Typical data transmission rate up to bit/s with f_0 = 56 kHz, V_S = 5 V (see Figure 5)
5. yyy means kind of packaging:
   ....DDW -> unsawn wafers in box
   ....6AQ -> (only on request, TSSOP8 taped and reeled)

Pad Layout

Figure 11. Pad Layout 1 (DDW only)

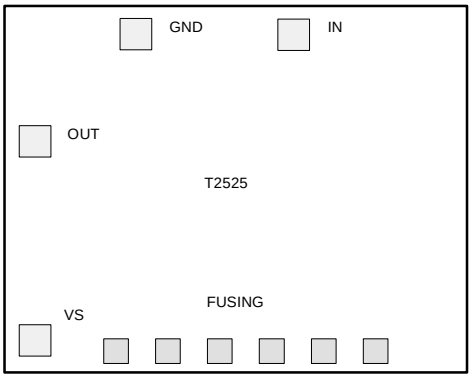
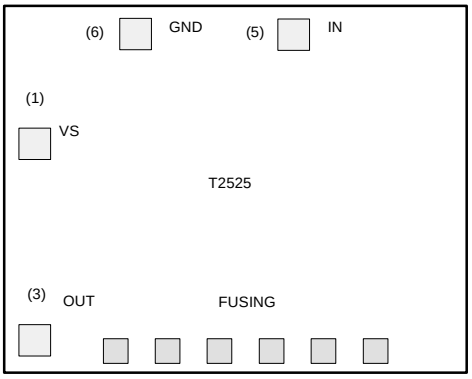


Figure 12. Pad Layout 2 (DDW, SO8 or TSSOP8)



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