



SP6026

Synchronous Rectifier Driver

DESCRIPTION

The fundamental of SP6026 synchronous rectifier (SR) driver IC is based on our U.S. patented methods that utilize the principle of “prediction” logic circuit. The IC deliberates previous cycle timing to control the SR in present cycle by “predictive” algorithm that makes adjustments to the turn-off time, in order to achieve maximum efficiency and avoid cross-conduction at the same time. Specially, SP6026 is designed for Resonance. It also maintains the MOSFET’s body diode conduction at minimum level. The SP6026 is capable to adapt in almost all existing Resonance converters with few adjustments considered necessary.

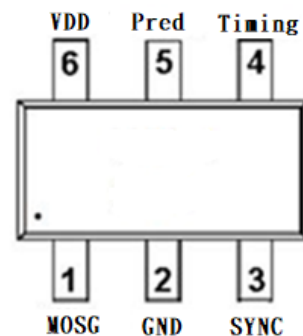
FEATURES

- Offers efficiency improvement over Schottky Diode.
- Low Standby Power to meet DOE Lot 6 requirement.
- Drives all Power MOSFET.
- Automatic detection DCM & CCM
- In DCM the current detection method is applied
- In CCM the prediction method is applied
- Minimum MOSFET body diode conduction.
- Operating frequency up to 200 KHz.
- Synchronize to transformer secondary voltage waveform.
- Minimum on time 1.8us (typical).
- External timing pin to adjust the falling slope

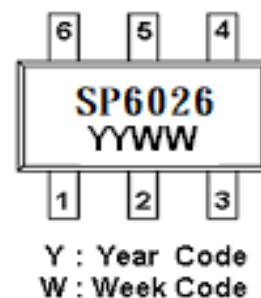
APPLICATIONS

- Switching Mode Power Supply
- Storage area network power supplies
- Telecommunication converters
- Embedded systems
- Industrial & commercial systems using high current processors
- Power converters to meet Lot 6 requirement

PIN CONFIGURATION (SOT-23-6L)



PART MARKING



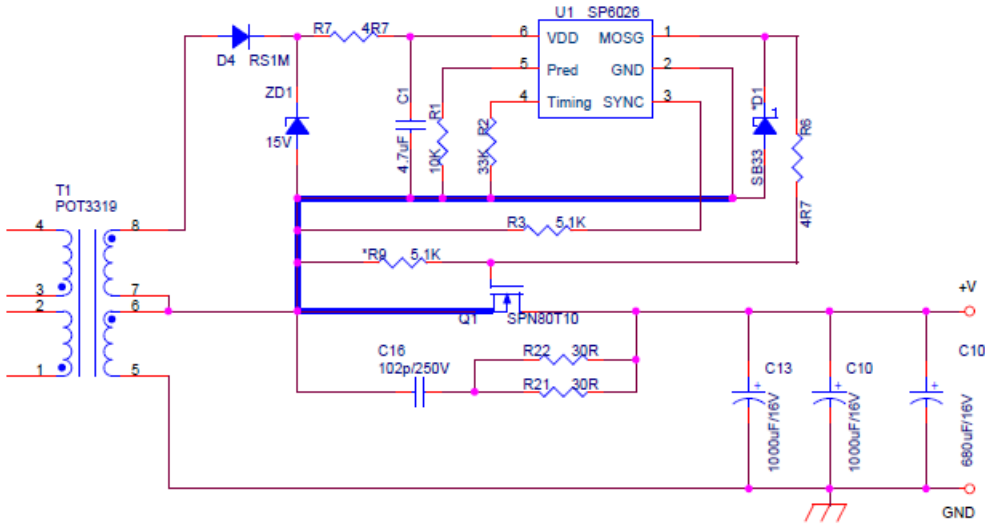


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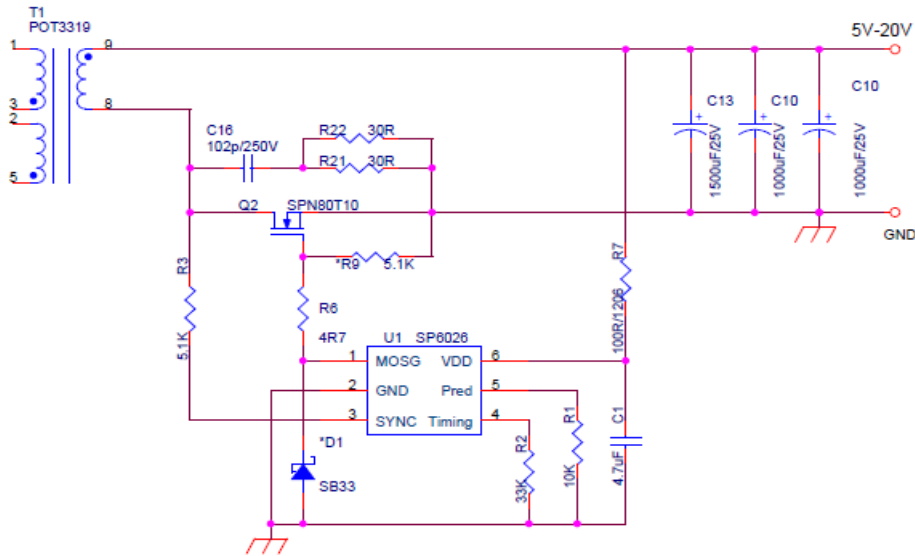
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TYPICAL APPLICATION CIRCUIT

SP6026_Demo board_H/S



SP6016E_Demo board_L/S



PIN DESCRIPTION

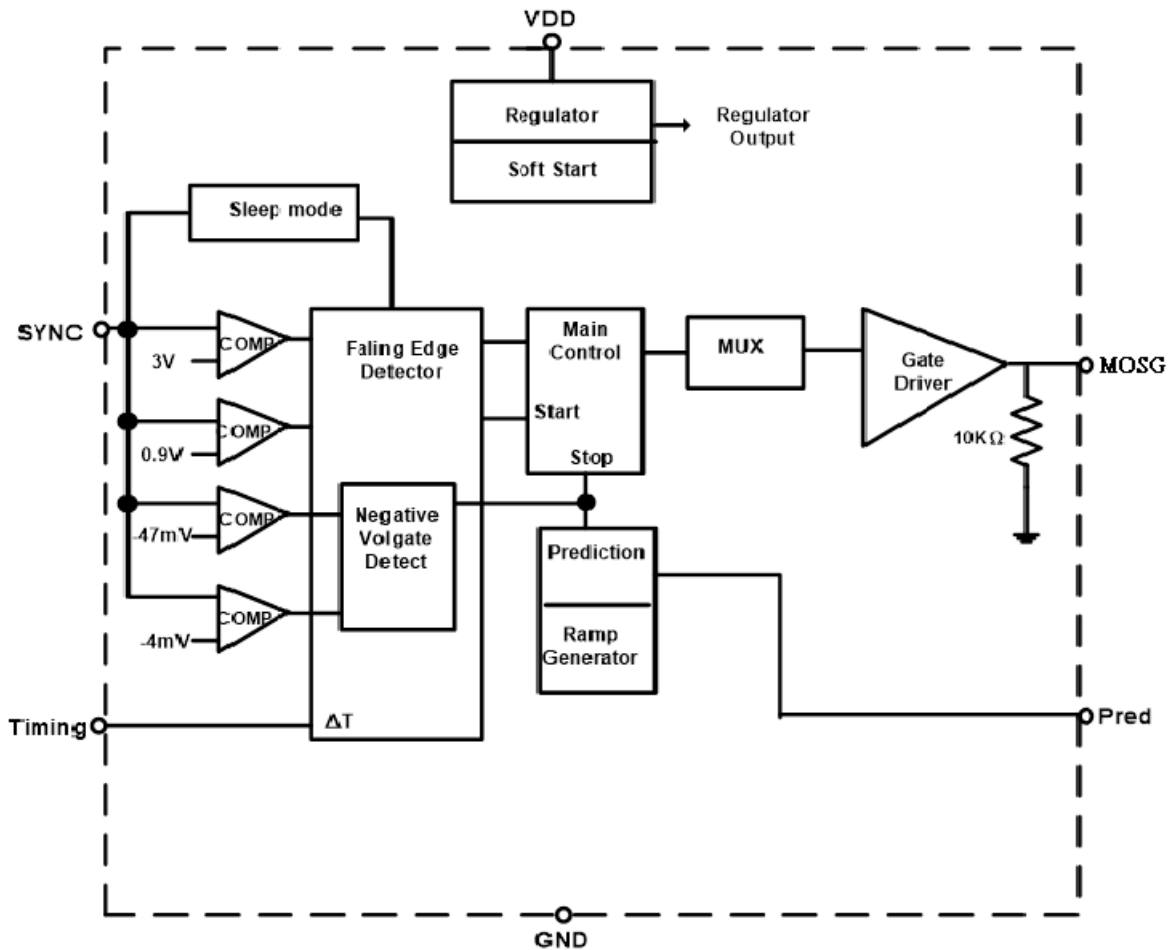
Pin	Symbol	Description
1	MOSG	MOSFET gate drive.
2	GND	Ground connection.
3	SYNC	Synchronized signal from the VDS of SR MOSFET.
4	Timing	Discontinuous current filter timing adjustment resistor connection.
5	Pred	Capacitor to store previous cycle timing for SR MOSFET.
6	Vdd	DC supply voltage.



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BLOCK DIAGRAM



ORDERING INFORMATION

Part Number	Package	Part Marking
SP6026S26RGB	SOT-23-6L	SP6026

※ SP6026S26RGB : Tape Reel ; Pb – Free ; Halogen - Free



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ABSOLUTE MAXIMUM RATINGS (TA=25°C, unless otherwise specified.)

The following ratings designate persistent limits beyond which damage to the device may occur.

Symbol	Parameter	Value	Unit
V _{dd}	DC Supply Voltage	20	V
I _{OUT}	Peak Source Current (Pulsed)	1.0	A
	Peak Sink Current (Pulsed)	1.5	A
P _D	Power Dissipation @ T _A =85°C (*)	0.3	W
T _J	Operating Junction Temperature Range	-40 to 125	°C
T _{STG}	Storage Temperature Range	-40 to 150	°C
T _{LEAD}	Lead Soldering Temperature for 5 sec.	260	°C

THERMAL RESISTANCE

Symbol	Parameter	Value	Unit
R _{θJC}	Thermal Resistance Junction – Case (*)	110	°C/W

(*) The power dissipation and thermal resistance are evaluated under copper board mounted with free air conditions.



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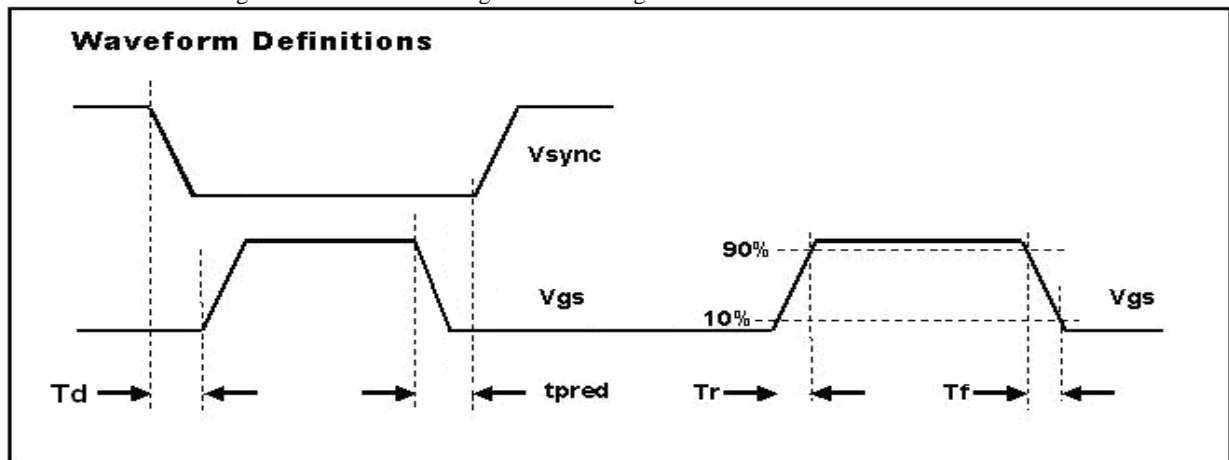
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ELECTRICAL CHARACTERISTICS

($T_A=25^\circ\text{C}$, $V_{dd}=12\text{V}$, Freq. =50 KHz, Duty Cycle=50%, unless otherwise specified.)

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
SUPPLY INPUT						
IDD	Supply current	No load & Sleep mode		0.15		mA
		$V_{\text{SYNC}}=0\text{V}$, V_{dd} on		3		mA
Vdd	Supply voltage	Idd peak < 1A	4.2		20	V
Vdd on	Enable voltage			3.8		V
Vdd hysteresis	Enable voltage			0.25	0.5	V
SYNC REFERENCE (SYNC)						
Vshth	SYNC high threshold			3.0		V
Vslth	SYNC low threshold			0.9		V
Vsync	SYNC clamp voltage	I _{sync} =3mA	V _{dd} +1.0			V
Vsync Sleep	SYNC sleep voltage	Pulse width >60 uS	3.5			V
I _{sync}	SYNC input current				15	mA
REFERENCE Voltage (V_Pred)						
V_Pred				1.25		V
Control Circuitry Section for Current detection mode						
Vfwd	V _{gnd} -V _{sync} forward voltage			47		mV
	V _{gnd} -V _{sync} turn-off voltage			4		mV
TBon	Turn-on blanking time			1.8		uS
TDoff	Turn-off total delay	V _{sync} =V _{gnd} , C _{LOAD} =4.7nF, R _G =0Ω, V _{GS} =2V		60		nS
MOSFET GATE DRIVER (MOSG)						
Voh	Output high voltage	I _o = -200mA		10.8		V
Vol	Output low voltage	I _o = 200mA		0.2		V
Vcl	Maximum Gate clamped voltage	V _{dd} =20V		15		V
Ton-max	MOSG maximum on time	Prediction mode		25		uS
Ton-min	MOSG minimum on time			1.8		uS
Td	Turn-on Propagation delay	No load, R _{Pred} =10KΩ		100		nS
Tpred	Dead time(prediction mode) in CCM	No load, R _{Pred} =10KΩ		750		nS
Tr	Rise time	Load = 1nF (*)		13		nS
Tf	Fall time	Load = 1nF (*)		7		nS

(*) Tr & Tf are measured among 10% and 90% of starting and final voltage.





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TYPICAL CHARACTERISTICS (TA=25°C, unless otherwise specified.)

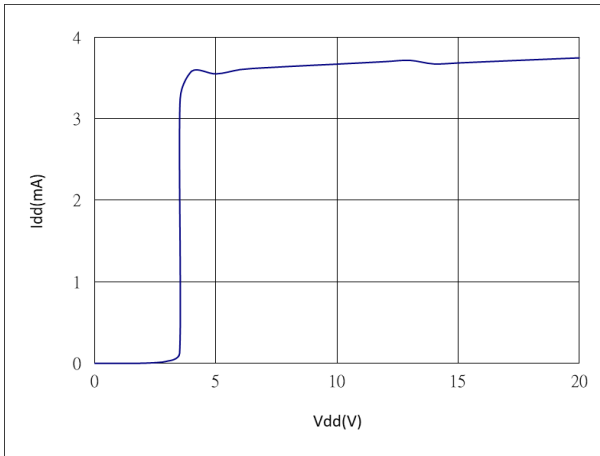


Figure 1 : Supply Current vs Supply Voltage

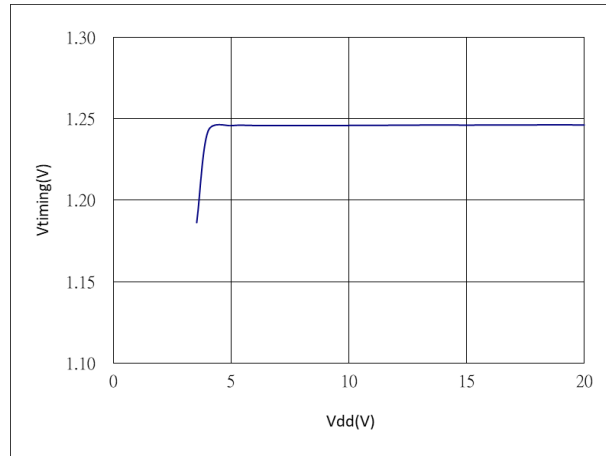


Figure 2 : Timing Voltage vs Supply Voltage

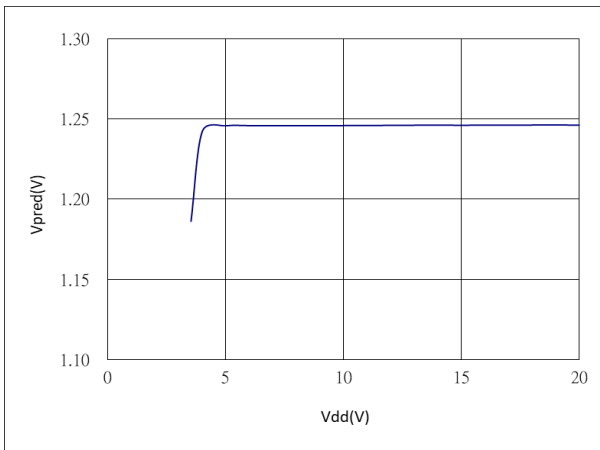


Figure 3 : Pred Voltage vs Supply Voltage

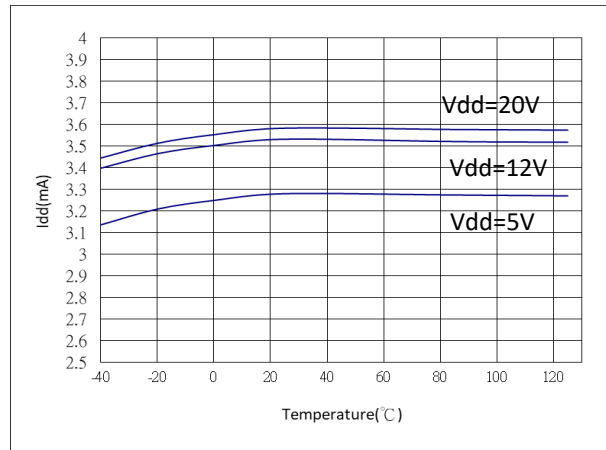


Figure 4 : Supply Current vs Temperature

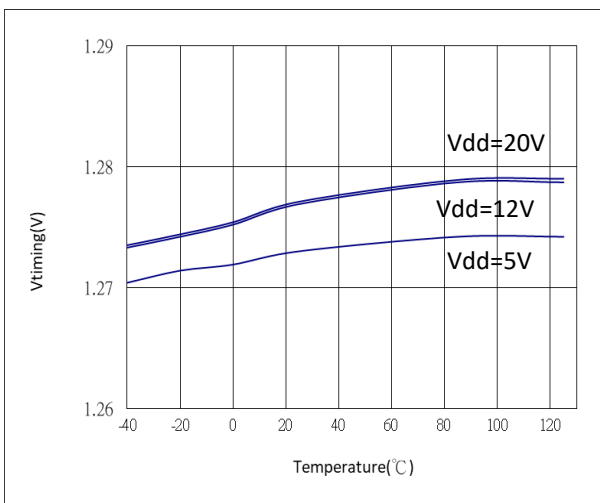


Figure 5 : Timing Voltage vs Temperature

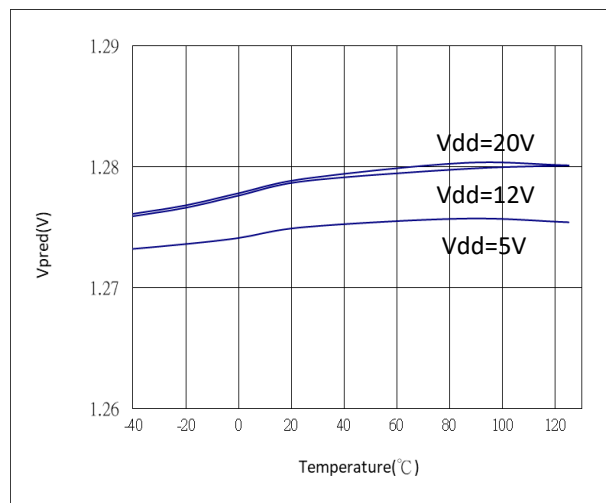


Figure 6 : Pred Voltage vs Temperature



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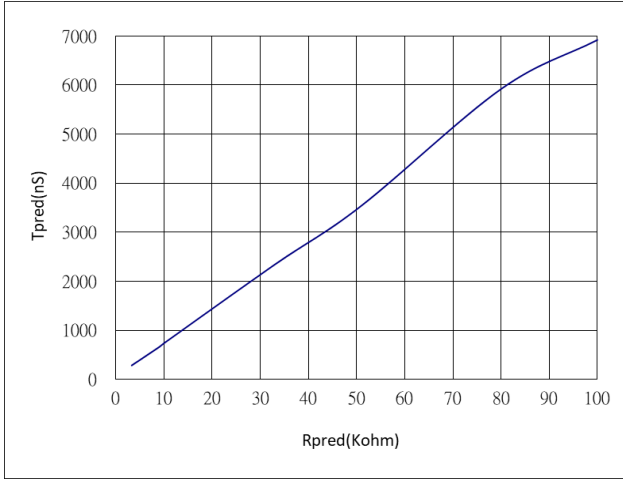


Figure 7 : Tpred vs Rpred

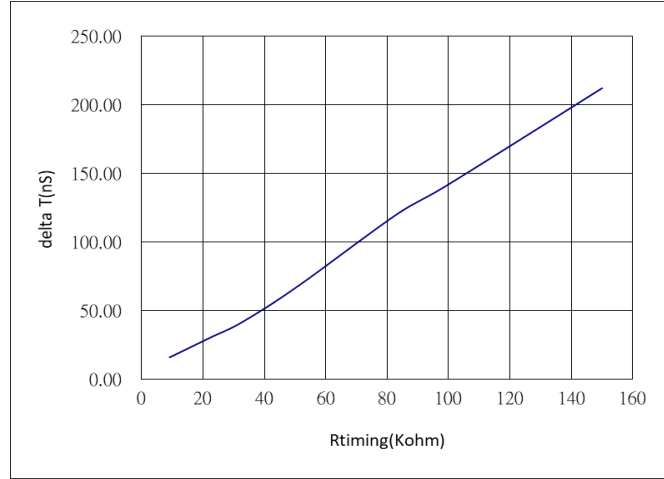


Figure 8 : SYNC Pin Falling Edge dv/dt vs Rtiming

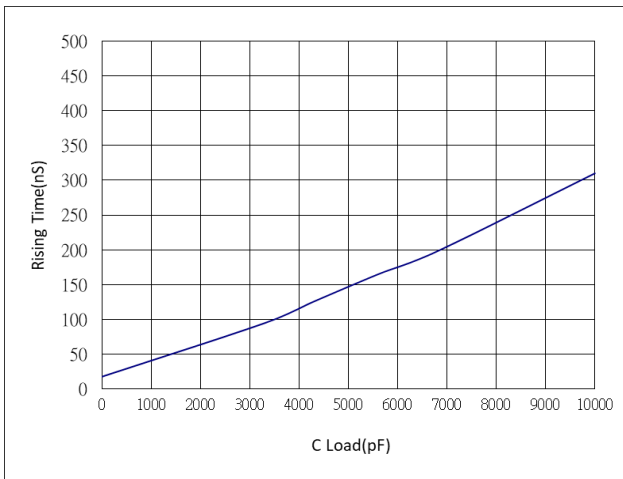


Figure 9 : Output Rising Time vs Load Capacitor

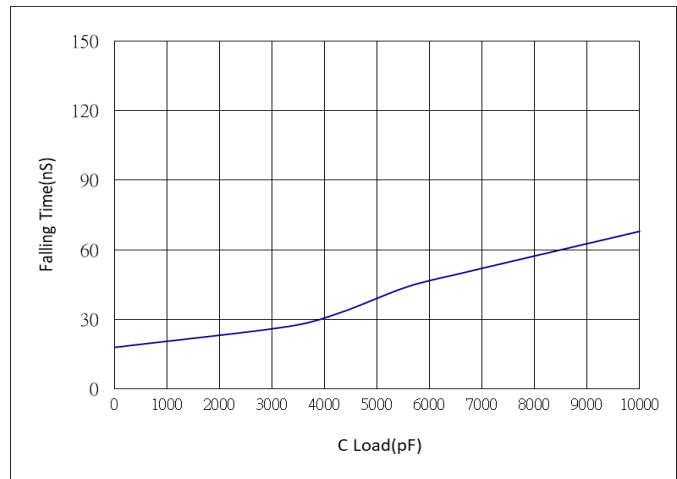


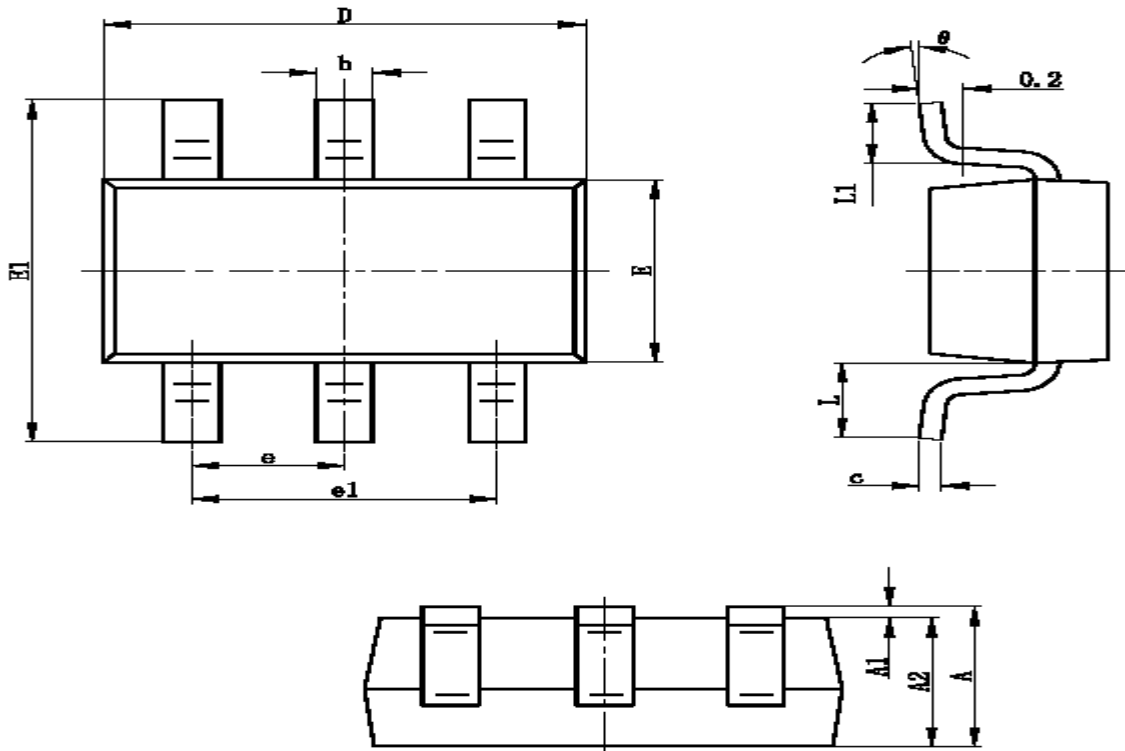
Figure 10 : Output Falling Time vs Load Capacitor



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SOT-23-6L PACKAGE OUTLINE



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	1.050	1.250	0.041	0.049
A1	0.000	0.100	0.000	0.004
A2	1.050	1.150	0.041	0.045
b	0.300	0.400	0.012	0.016
c	0.100	0.200	0.004	0.008
D	2.820	3.020	0.111	0.119
E	1.500	1.700	0.059	0.067
E1	2.650	2.950	0.104	0.116
e	0.950TYP		0.037TYP	
e1	1.800	2.000	0.071	0.079
L	0.700REF		0.028REF	
L1	0.300	0.600	0.012	0.024
θ	0°	8°	0°	8°



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