

■ GENERAL DESCRIPTION

MST9611 is an Over-Voltage-Protection (OVP) and Over-Current-Protection (OCP) device. It can disconnect IN to OUT to protect load in case wrong input operating conditions are detected. The system is positive overvoltage protected up to 36V. The internal overvoltage thresholds (OVLO) is 6.1V and internal overcurrent thresholds (OCP) is 2.7A. MST9611 also has internal over temperature protect(OTP) function and it can monitor chip temperature to protect the device.

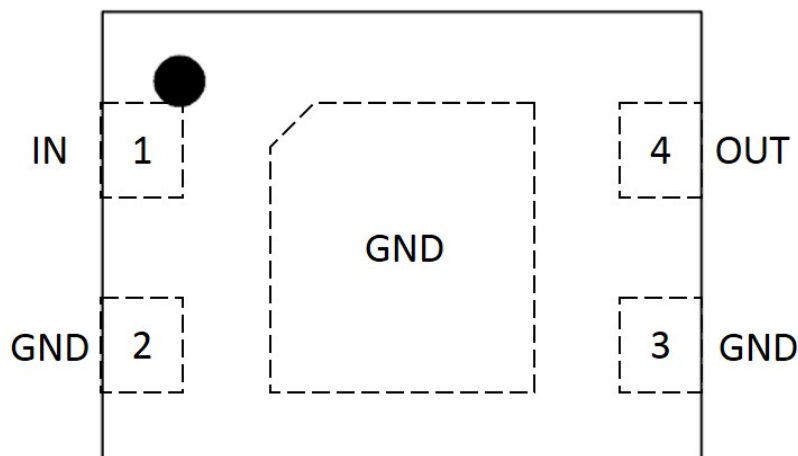
The device is packaged in advanced full-Green Packaging (DFN4).

■ FEATURES

- Typical R_{ON} : 100m Ω NMOS @5V/1A
- Maximum Output Current: 2.5A.
- V_{IN} Operating Range: 2.5V to 36V
- Internal Overvoltage Lockout : 6.1V
- Internal Overcurrent Lockout : 2.7A(MIN)
- Overvoltage-Protection Response Time : <500ns
- Startup Debounce Time: 16ms(TYP).
- Typical Output Power on Time: 16.5ms(TYP).
- Internal Thermal-Shutdown Protection
- ESD Protected: Human Body Model : JESD22-A114(All pins) \pm 2KV

■ APPLICATION

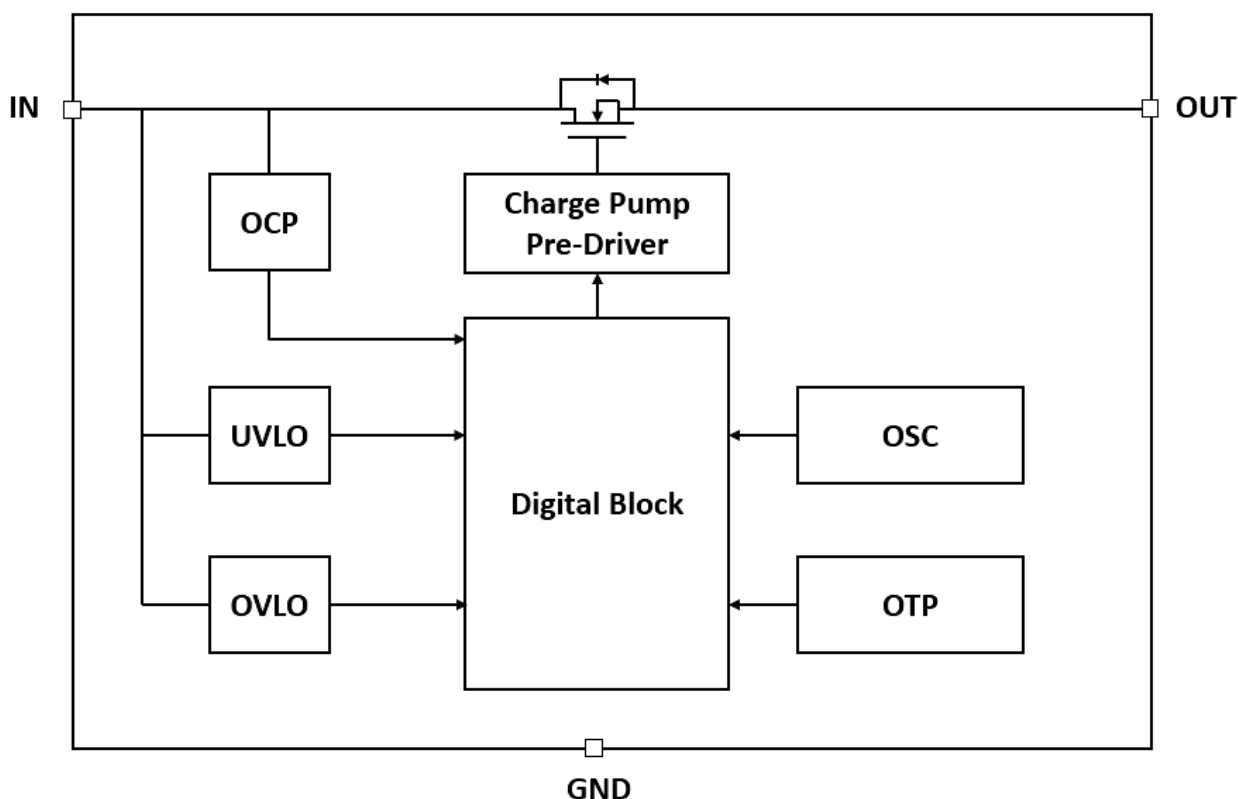
- GPS and Navigation Equipment
- Portable Media Devices, Laptop & MID
- SLR Digital Cameras
- Industrial Handheld and Enterprise Equipment



■ PIN ASSIGNMENT

PIN	NAME	DISCRIPTION
1	IN	Input Voltage.
2、3	GND	Ground. Connect GND pins together for proper operation.
4	OUT	Load Output.

■ BLOCK DIAGRAM



■ FUNCTIONAL DESCRIPTION

The OVP switch with overvoltage protection feature a low 100mΩ (typical) on-resistance(R_{ON}) internal FET and protect low-voltage systems against voltage faults up to 36V_{DC}. The internal overvoltage thresholds (OVLO) is 6.1V and internal overcurrent thresholds (OCP) is 2.7A.

The internal FET turns off when the junction temperature exceeds +155°C (TYP.). The device exits thermal shutdown after the junction temperature cools by 20°C (TYP.).

Input Capacitor

To limit the voltage drop on the input supply caused by transient inrush current when the switch turns on into a discharged load capacitor or short-circuit, a capacitor 1 μ F or larger must be placed between the VIN and GND pins.

Output Capacitor

A 1 μ F or larger capacitor should be placed between the OUT and GND pins.

■ ABSOLUTE MAXIMUM RATINGS

Stresses exceeding the absolute maximum ratings may damage the device. The device may not function or be operable above the recommended operating conditions and stressing the parts to these levels is not recommended. In addition, extended exposure to stresses above the recommended operating conditions may affect device reliability. The absolute maximum ratings are stress ratings only.

SYMBOL	PARAMETERS	MIN	MAX	UNIT
V _{IN}	VIN to GND	-0.3	36	V
V _{OUT}	VOUT to GND	-0.3	28	V
I _{SW1}	Maximum Continuous Current of switch IN-OUT		2.7	A
I _{SW2}	Maximum Peak Current of switch IN-OUT(10ms)		4	A
P _D	Power Dissipation at T _A = +70°C		1.0	W
T _{STG}	Storage Junction Temperature	-65	+150	°C
T _A	Operating Temperature Range	-40	+85	°C
T _{Store}	Soldering Temperature (reflow).		+260	°C
T _J	Junction Temperature		+150	°C

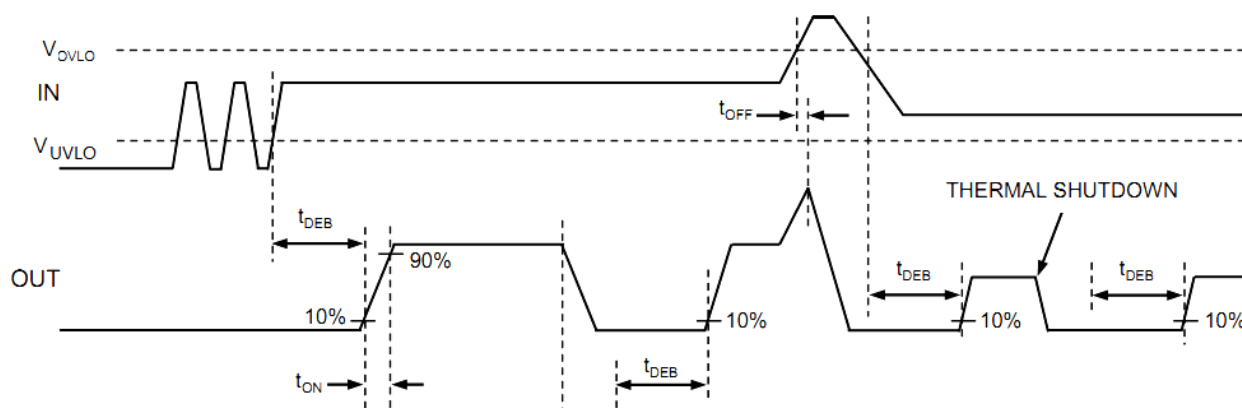
**■ ELECTRICAL CHARACTERISTICS**Unless otherwise noted, typical values are at $V_{IN}=5V$ and $T_A=25^{\circ}C$.

SYMBOL	PARAMETERS	CONDITIONS	MIN	TYP	MAX	UNIT
Basic Operation						
V_{IN}	Input Voltage		2.5		36	V
I_{IN}	V_{IN} Quiescent Current	$V_{IN}=5V$, OUT floating		110		μA
R_{ON}	On-Resistance of Switch IN-OUT	$V_{IN}=5.0V$, $I_{OUT}=1A$		100		m Ω
$R_{discharge}$	Output discharge resistance			4.0		K Ω
V_{OVLO}	Overvoltage protect of V_{IN}	V_{IN} rise up	5.9	6.1	6.3	V
	Overvoltage protect hysteresis of V_{IN}			0.25		V
V_{UVLO_R}	Under Voltage Lockout Threshold	V_{IN} Rising		2.2		V
Input Over						
t_{DEB}	Debounce Time	Time from $2.1V < V_{IN} < V_{OVLO}$ to $V_{OUT}=10\%$ of V_{IN}		16		ms
t_{ON}	Switch Turn-On Time	$R_L=100\Omega$, $C_L=22\mu F$, V_{OUT} from $0.1 \times V_{IN}$ to $0.9 \times V_{IN}$		0.5		ms
t_{ON_ALL}	Output power-on Time	Time from $2.1V < V_{IN} < V_{OVLO}$ to $V_{OUT}=90\%$ of V_{IN}		16.5		ms
$t_{OFF_RES}^{(1)}$	Switch turn-off response time	$V_{IN} > V_{OVLO}$ to V_{OUT} stop rising		150	300	ns
Dynamic Characteristics: see figure						
I_{OCP}	Overcurrent protect of I		2.7	3.3		A

ISHORT			180		mA
TOCP	OCP debounce time		30		ms
TREC_OCP	OCP recovery time		1		s
Over Temperature Protection (OTP)					
Thermal Shutdown			155		°C
Thermal-shutdown Hysteresis			20		°C

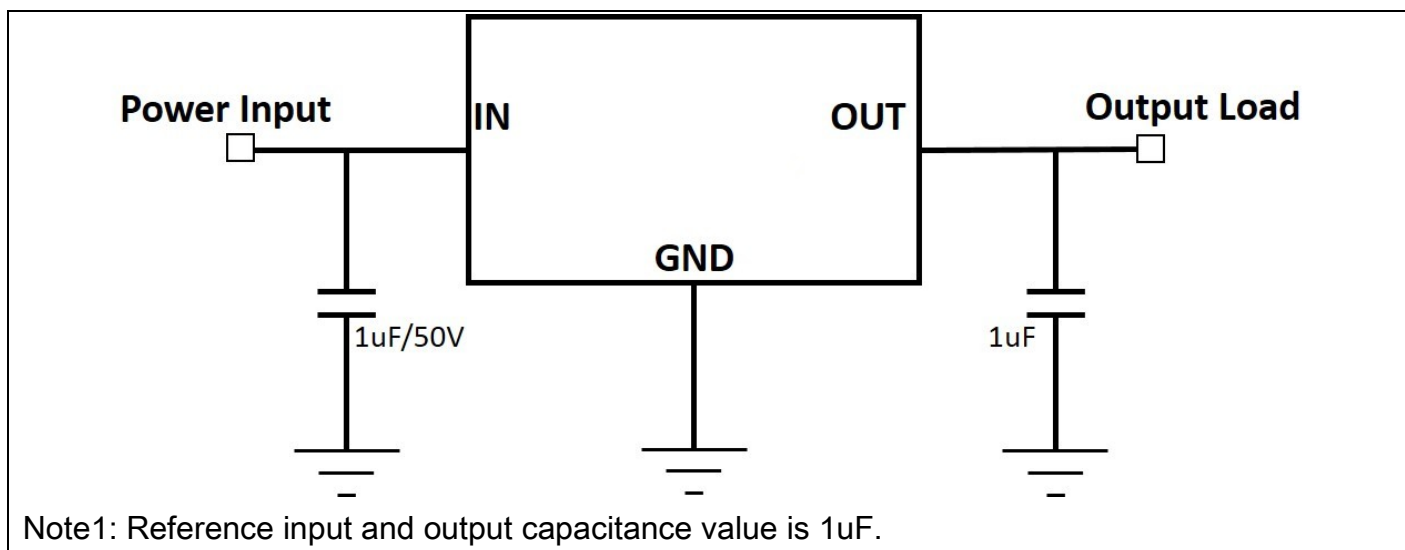
Note :

- Guaranteed by characterization and design.



* NOTE: WAVEFORMS ARE NOT TO SCALE

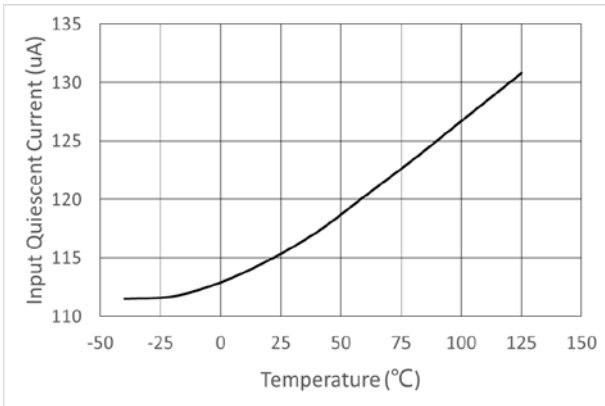
APPLICATION CIRCUITS



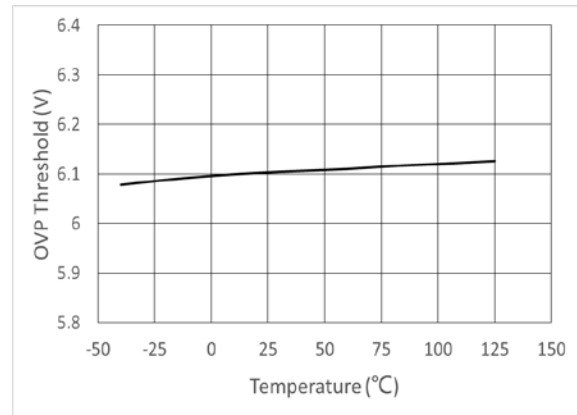
Note1: Reference input and output capacitance value is 1uF.

* : This electric circuit only supplies for reference.

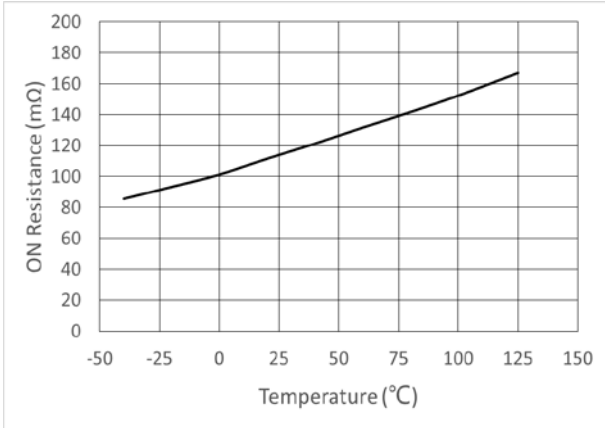
TYPICAL CHARACTERISTICS



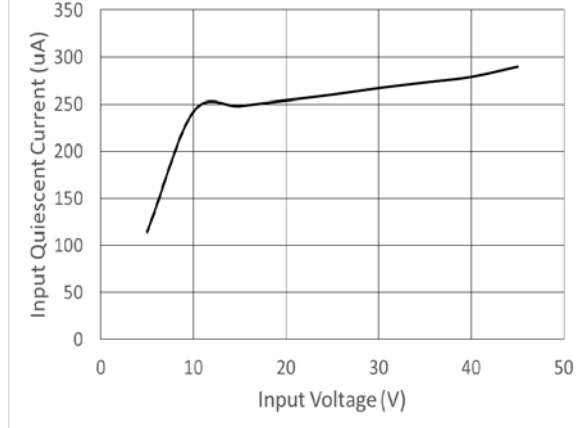
Input Quiescent Current vs. Temperature



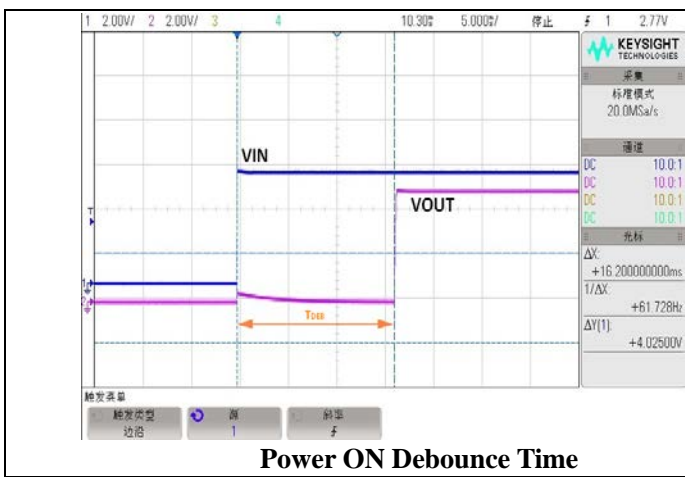
OVP threshold vs. Temperature



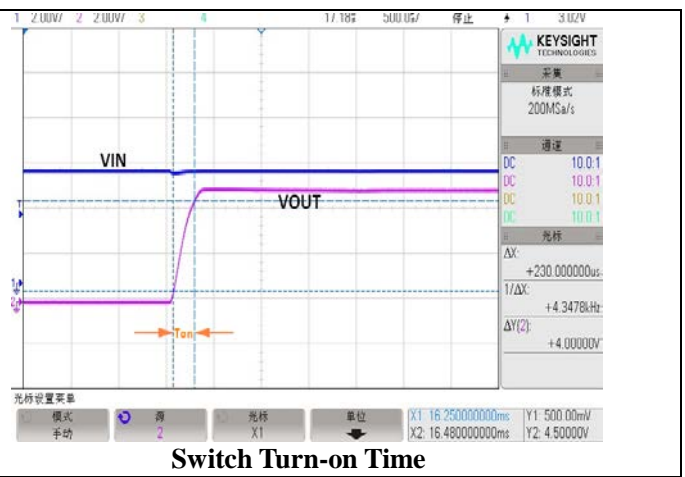
On Resistance vs. Temperature



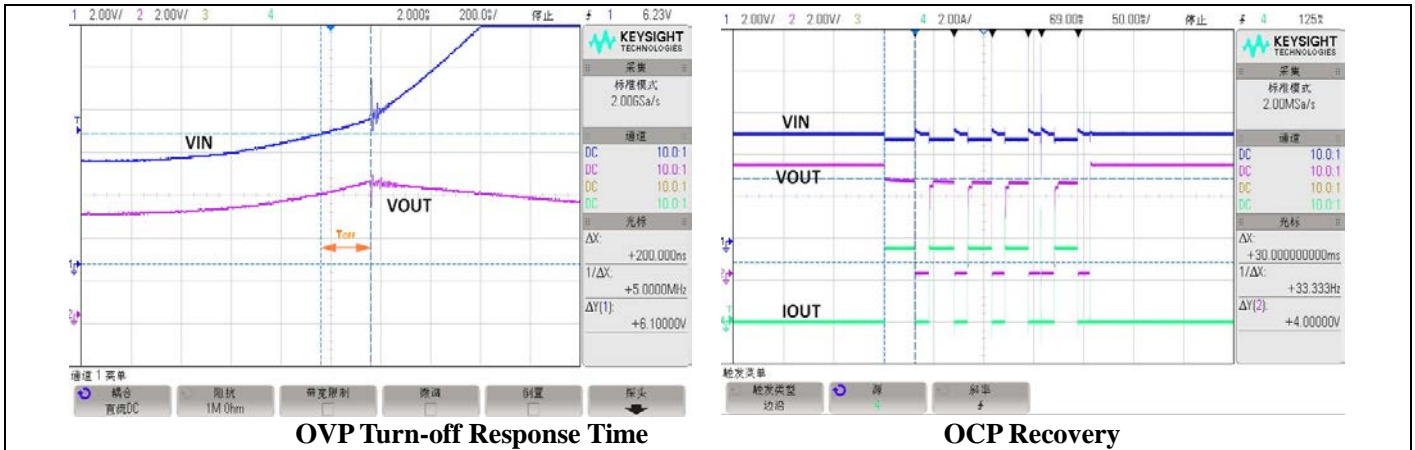
Input Quiescent Current vs. Input Voltage



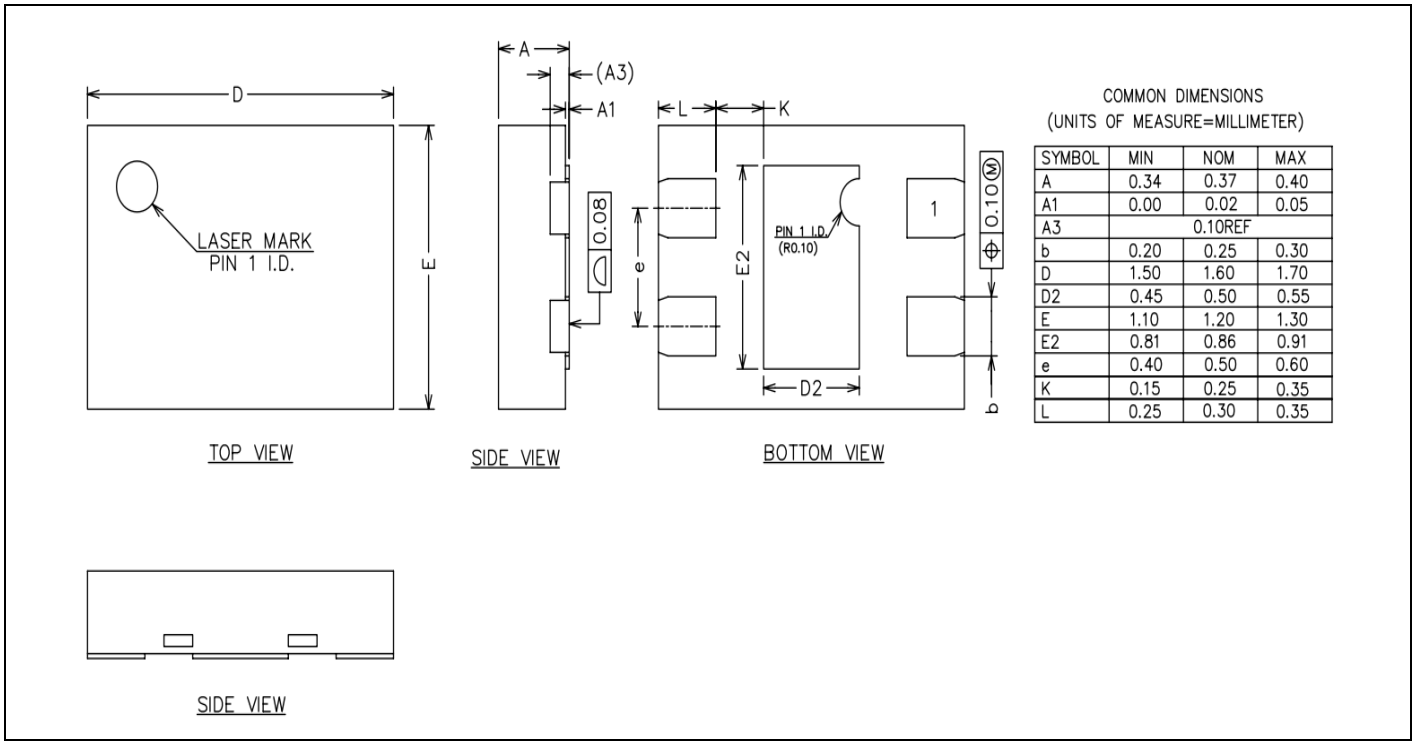
Power ON Debounce Time



Switch Turn-on Time



PACKAGE DIMENSION



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