Switching Regulators

STR-W6754

Data Sheet 28103.32*

Universal-Input/100 W Off-Line Quasi-Resonant Flyback Switching Regulator



ABSOLUTE MAXIMUM RATINGS at T_A = +25°C

Control Supply Voltage, V_{CC} . . . . **35 V**
Drain-Source Voltage, V_{DSS} . . . . . **650 V**
Drain Switching Current, I_D . . . . . **15 A***
Peak Drain Switching Current, I_{DM} . . . . . **15 A**
Single-Pulse Avalanche Energy, E_{AS} . . . . . **292 mJ**
OCP/BD Voltage Range, V_{OCP} . . . . . **–1.5 V to +5 V**
FB Input Current, I_{FB} . . . . . **10 mA**
FB Voltage Range, V_{FP} **–0.5 V to +9 V**
Package Power Dissipation, P_D
control (V_{CC} × $I_{CC(ON)}$) . . . . . **0.8 W**
MOSFET (V_{DSS} × I_D) . . . **See Graph**
MOSFET Channel Temp., T_J . **+150°C**
Internal Frame Temp., T_F . . . . **+115°C**
Operating Temperature Range, T_A . . . . . **-20°C to +115°C**
Storage Temperature Range, T_S . . . . . **-40°C to +125°C**

* Drain switching current is limited by temperature (page 2) and safe operating area (page 5).
†For the availability of parts meeting -40°C requirements, contact Allegro's Sales Representative.

The STR-W6754 is a quasi-resonant regulator specifically designed to satisfy the requirements for increased integration and reliability in switch-mode power supplies. It incorporates a primary control and drive circuit with an avalanche-rated power MOSFET. The regulator exhibits only low-level high-frequency EMI noise because of soft switching of the MOSFET close to ground (bottom point). A bottom-skip function minimizes an increase of operational frequency during light loads to improve system efficiency over the entire load range.

Covering the power range from below 160 watts for a 230 VAC input, or 100 watts for a universal input (85 to 264 VAC), this device can be used in a range of applications, from DVD and VCR players to ac adapters for cellular phones and digital cameras. An auto-standby function, which is internally triggered by sensing on time, reduces power consumption at light load. An externally triggered standby mode reduces the input power further. Multiple protections, including the avalanche-energy-guaranteed MOSFET, provide high reliability of system design. Devices with an increased output power rating are the STR-W6756.

Cycle-by-cycle current limiting, undervoltage lockout with hysteresis, and overvoltage protection protect the power supply during the normal overload and fault conditions. Overvoltage protection is latched after a short delay. The latch may be reset by cycling the input supply. Low start-up current and a low-power standby mode selected from the secondary circuit completes a comprehensive suite of features. The STR-W6754 is provided in a fully molded TO-220-style flange-mounted, high power, isolated plastic package.

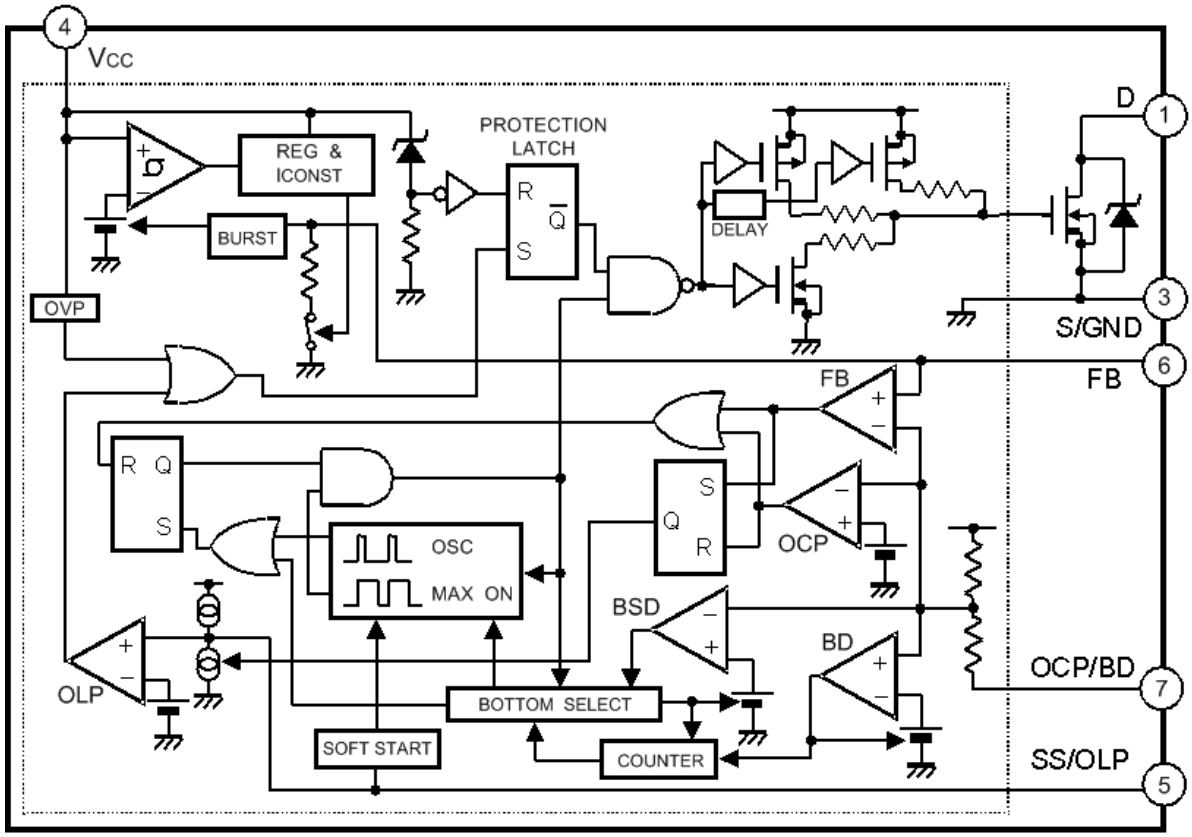
FEATURES AND BENEFITS

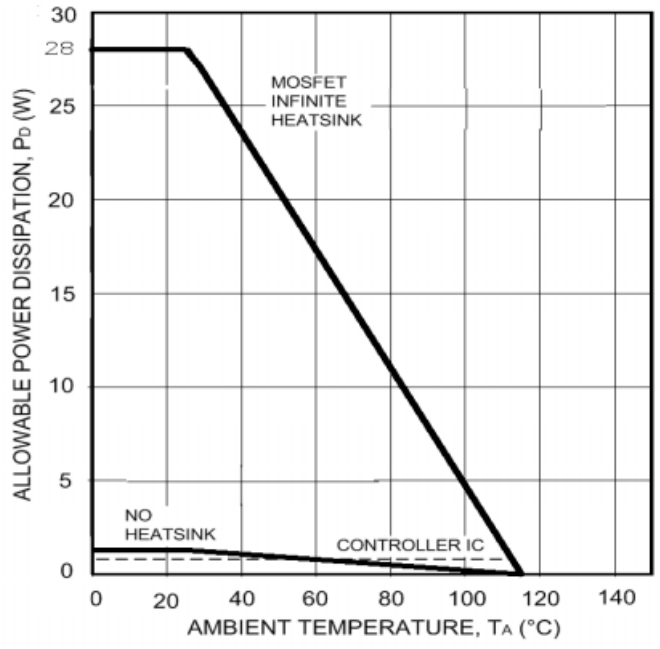
- Rugged 650 V Avalanche-Rated MOSFET
  Simplified Surge Absorption
  No V_{DSS} Derating Required
- 0.96 Ω Maximum $r_{DS(on)}$
- Two Operational Modes by Automatic Switching:
  Quasi-Resonant Mode for Normal Operation
  Burst Mode for Standby Operation or Light Loads
- Automatic or Manually Triggered Burst Standby
  Input Power <0.1 W at No Load
- Low Operating Current (6 mA typ)

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Always order by complete part number, e.g., **STR-W6754** .

FUNCTIONAL BLOCK DIAGRAM





FEATURES AND BENEFITS (cont'd)

- Auto-Bias Function
  Stable Burst Operation Without Generating Interference
- Internal Off-Timer Circuit
- Built-In Constant-Voltage Drive
- Multiple Protections:
  Pulse-by-Pulse Overcurrent Protection
  Overload Protection with Auto Recovery
  Latching Overvoltage Protection
  Undervoltage Lockout with Hysteresis
- RoHS Compliant

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ELECTRICAL CHARACTERISTICS at T_A = +25°C, V_{CC} = 20 V, voltage measurements are referenced to S/GND terminal (unless otherwise specified).

Characteristic	Symbol	Test Conditions	Limits			
			Min.	Typ.	Max.	Units
Start-Up Operation						
Operation Start Voltage	$V_{CC(ON)}$	Turn-on, V_{CC} = 0 ➝ 19.9 V	16.3	18.2	19.9	V
Soft-Start Operation Stop Voltage	$V_{SS/OLP}$		1.1	1.2	1.4	V
Soft-Start Oper. Charging Current	$I_{SS/OLP}$		-390	-550	-710	µA
Operation Stop Voltage	$V_{CC(OFF)}$	Turn-off, V_{CC} = 19.9 ➝ 8.8 V	8.8	9.7	10.6	V
Circuit Current in Non-Operation	$I_{CC(OFF)}$	V_{CC} = 15 V	–	–	100	µA
Normal Operation						
Drain-Source Breakdown Voltage	$V_{(BR)DSS}$	I_D = 300 µA	650	–	–	V
Drain Leakage Current	I_{DSS}	V_{DS} = 650 V	–	–	300	µA
On-State Resistance	$r_{DS(on)}$	I_D = 1.9 A, T_J = +25°C	–	–	0.96	Ω
Switching Time	t_f		–	–	400	ns
Circuit Current	$I_{CC(ON)}$		–	–	6.0	mA
Oscillation Frequency	f_{osc}		19	22	25	kHz
Bottom-Skip Oper. Threshold Volt.	$V_{OCPBD(BS1)}$		-605	-665	-720	mV
	$V_{OCPBD(BS2)}$		-385	-435	-485	mV
Quasi-Resonant Oper. Threshold	$V_{OCPBD(TH1)}$		280	400	520	mV
	$V_{OCPBD(TH2)}$		670	800	930	mV
Feedback-Pin Threshold Voltage	$V_{FB(OFF)}$		1.32	1.45	1.58	V
Feedback-Pin Current	$I_{FB(ON)}$		600	1000	1400	µA
Standby Operation						
Standby Operation Start Voltage	$V_{CC(S)}$	V_{CC} = 0 ➝ 12.2 V	10.3	11.1	12.1	V
Standby Oper. Start Volt. Interval	V_{CC}		1.10	1.35	1.65	V
Standby Non-Operation Current	$I_{CC(S)}$	V_{CC} = 10.2 V	–	20	56	µA
Feedback-Pin Current	$I_{FB(ON)}$	V_{CC} = 10.2 V	–	4.0	14	µA
Feedback-Pin Threshold Voltage	$V_{FB(S)}$	V_{CC} = 12.2 V	0.55	1.10	1.50	V
Minimum ON Time	$t_{on(min)}$		0.5	0.8	1.2	µs

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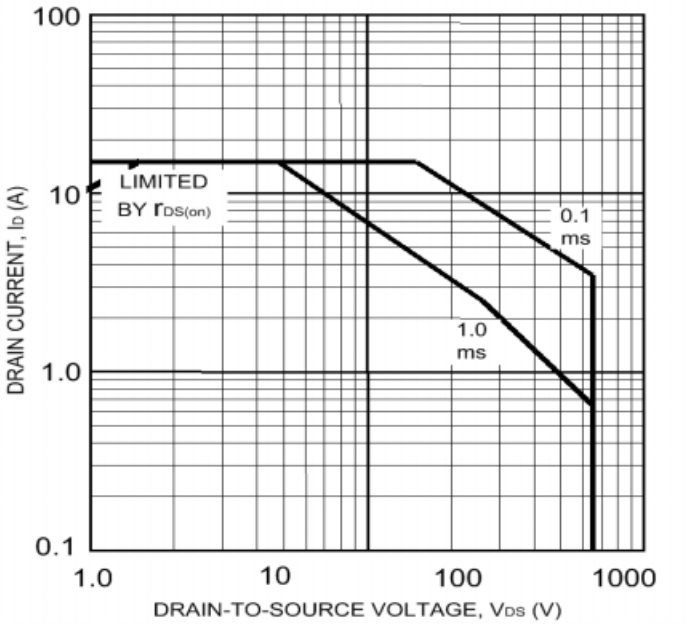
ELECTRICAL CHARACTERISTICS at T_A = +25°C, V_{CC} = 20 V, voltage measurements are referenced to S/GND terminal (unless otherwise specified).

Characteristic	Symbol	Test Conditions	Limits			
			Min.	Typ.	Max.	Units
Protection Operation						
OVP Operation Voltage	$V_{CC(OVP)}$	Turn-off, V_{CC} = 0 → 29.9 V	25.5	27.7	29.9	V
Maximum ON Time	$t_{on(max)}$		27.5	32.5	39.0	µs
OLP Operation Voltage	V_{SSOLP}		4.0	4.9	5.8	V
OLP Operation Current	I_{SSOLP}		-6.0	-11	-16	µA
Overcurrent Detect. Threshold Volt.	$V_{OCPBD(LIM)}$		-0.895	-0.940	-0.995	V
OCP/BD-Pin Current	I_{OCPBD}		-40	-100	-250	µA
Latch Holding Current	$I_{CC(H)}$	V_{CC} = 29.9 → $V_{CC(OFF)}$ – 0.3 V	–	45	140	mA
Latch Release Voltage	$V_{CC(L)}$	V_{CC} = 29.9 → 6 V	6.0	7.2	8.5	V
Other						
Thermal Resistance	$R_{\theta JF}$	Output junction-to-frame	–	–	1.6	°C/W

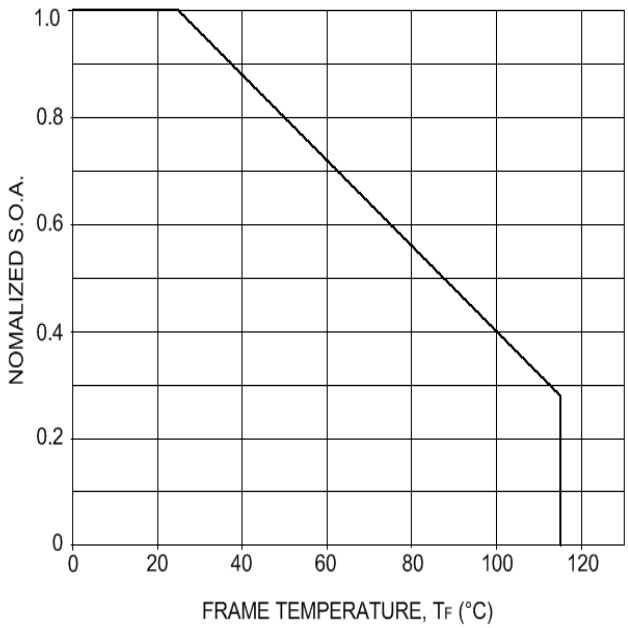
NOTES: 1. Typical Data is for design information only.
2. Negative current is defined as coming out of (sourcing) the specified device termninal.

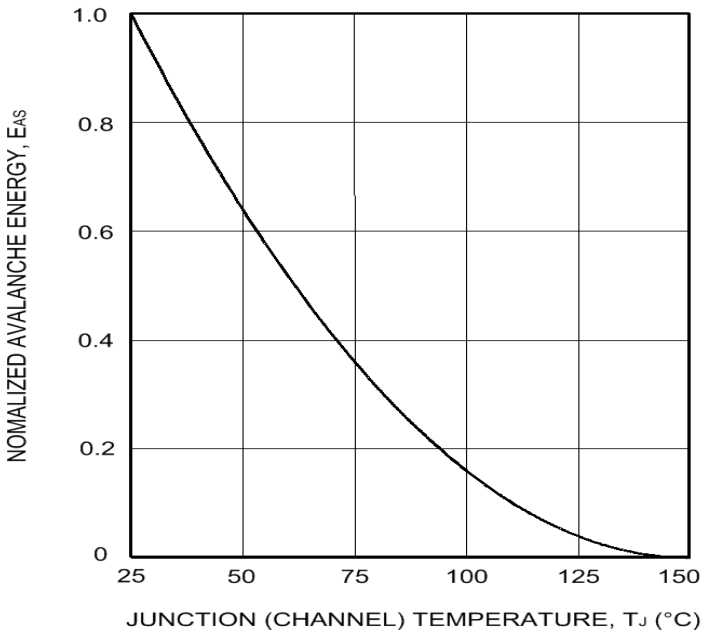
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MOSFET TYPICAL CHARACTERISTICS

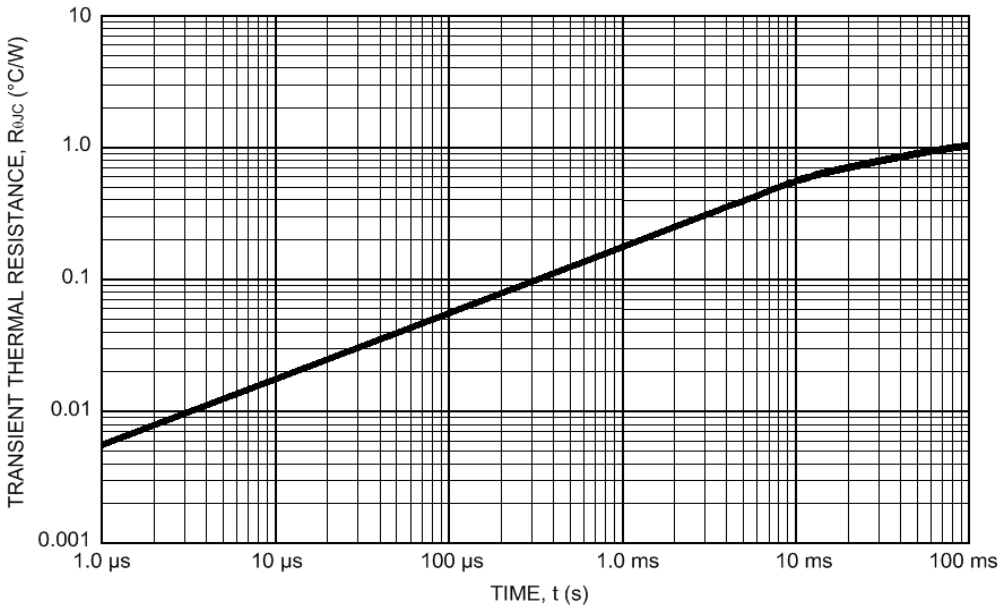


Avalanche energy is measured at V_{DD} = 99 V,
L = 20 mH, I_L = 5.1 A.





MOSFET TYPICAL CHARACTERISTICS (cont'd)

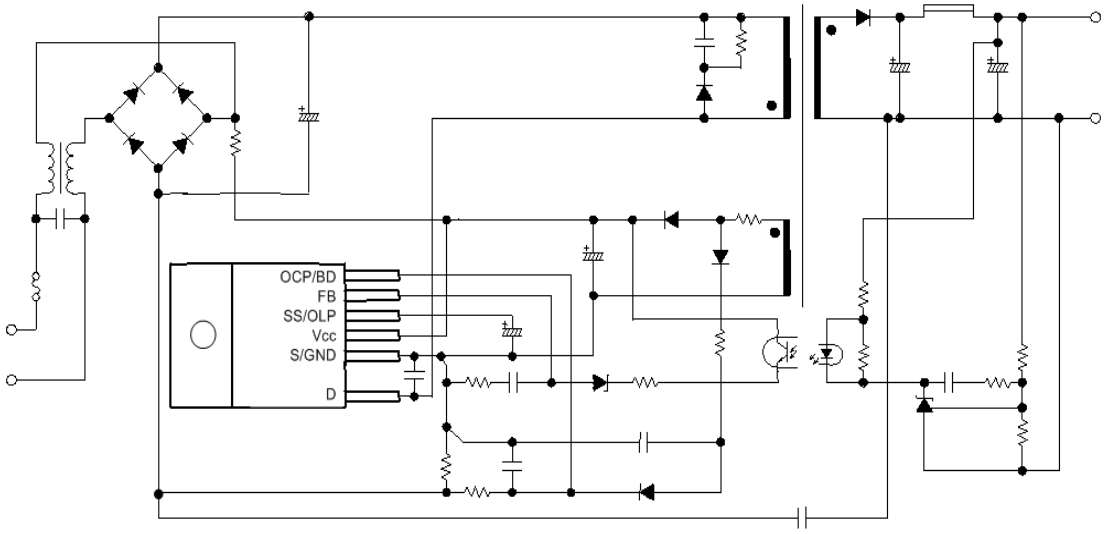


WARNING — These devices are designed to be operated at lethal voltages and energy levels. Circuit designs that embody these components must conform with applicable safety requirements. Precautions must be taken to prevent accidental contact with power-line potentials. Do not connect grounded test equipment.

The use of an isolation transformer is recommended during circuit development and breadboarding.

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APPLICATIONS INFORMATION



Typical Application

Complete product description and applications information is provided in Application Note 28103.30, *Series STR-W6750 Off-Line Quasi-Resonant Flyback Switching Regulators*.

The products described herein are manufactured in Japan by Sanken Electric Co., Ltd. for sale by Allegro MicroSystems, Inc.

Sanken and Allegro reserve the right to make, from time to time, such departures from the detail specifications as may be required to permit improvements in the performance, reliability, or manufacturability of its products. Therefore, the user is cautioned to verify that the information in this publication is current before placing any order.

When using the products described herein, the applicability and suitability of such products for the intended purpose shall be reviewed at the users responsibility.

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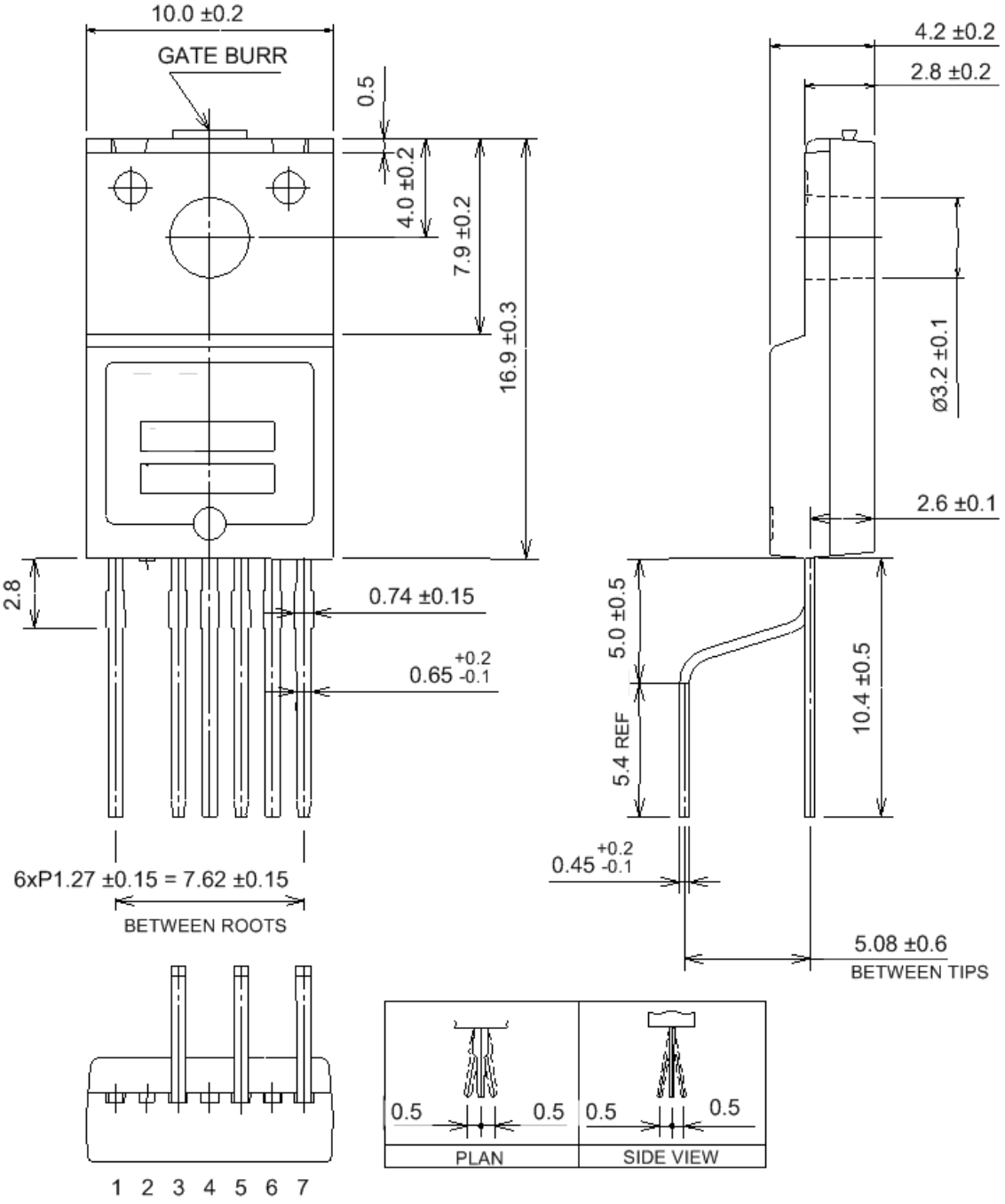
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PACKAGE DIMENSIONS
in Millimeters



Product weight: approx. 2.3 g.
Recommended mounting hardware torque: 0.588 ~ 0.785 Nm, 6 ~ 8 kgf × cm.
Recommended silicon grease: Dow Corning SC102, Toshiba YG6260, Shin-Etsu G746, or equivalent.

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