Ordering number : ENN8294

SANYO Semiconductors
DATA SHEET

ExPD (Excellent Power Device)

TN6Q04 — Quasi-Resonant Switching Power Supply ExPD

Features

- Quasi-resonant type original control IC.
- High voltage power MOSFET with current sense.
- Low input voltage protection (self reset)
- Overvoltage protection (latch).
- Overcurrent protection (pulse-by-pulse).

Specifications

Absolute Maximum Ratings at Ta=25°C

Parameter	Symbol	Conditions	Ratings	unit
[All voltage parameters are absolute voltage referenced to GND]				
Drain-to-Source Voltage	V_{DSS}	3-5	650	V
Drain Current (DC)	I_D	3-5	5.5	A
Drain Current (Pulse)	I_{DP}	3-5 PW≤10μs, duty cycle≤1%	16.5	A
V_{DD} Pin Applied Voltage	V_{DD}	4-5	−0.3 to 16.7	V
FB Pin Applied Voltage	V_{FB}	1-5	−0.3 to V_{DD}+0.3	V
EDGE Pin Applied Voltage	V_{EDGE}	2-5	−0.3 to V_{DD}+0.3	V
Allowable Power Dissipation	P_D		2	W
		Tc=25°C	35	W
Operating Temperature	Topr		−25 to +125	°C
Junction Temperature	Tj		150	°C
Storage Temperature	Tstg		−55 to +150	°C
Avalanche Energy (Single Pulse) *1	E_{AS}	3-5	155	mJ
Avalanche Current *2	I_{AV}	3-5	5.5	A

*1 V_{DD}=50V, L=10mH, I_{AV}=5.5A

*2 L≤10mH, single pulse

■ Any and all SANYO products described or contained herein do not have specifications that can handle applications that require extremely high levels of reliability, such as life-support systems, aircraft's control systems, or other applications whose failure can be reasonably expected to result in serious physical and/or material damage. Consult with your SANYO representative nearest you before using any SANYO products described or contained herein in such applications.

■ SANYO assumes no responsibility for equipment failures that result from using products at values that exceed, even momentarily, rated values (such as maximum ratings, operating condition ranges, or other parameters) listed in products specifications of any and all SANYO products described or contained herein.

SANYO Electric Co.,Ltd. Semiconductor Company
TOKYO OFFICE Tokyo Bldg., 1-10, 1 Chome, Ueno, Taito-ku, TOKYO, 110-8534 JAPAN

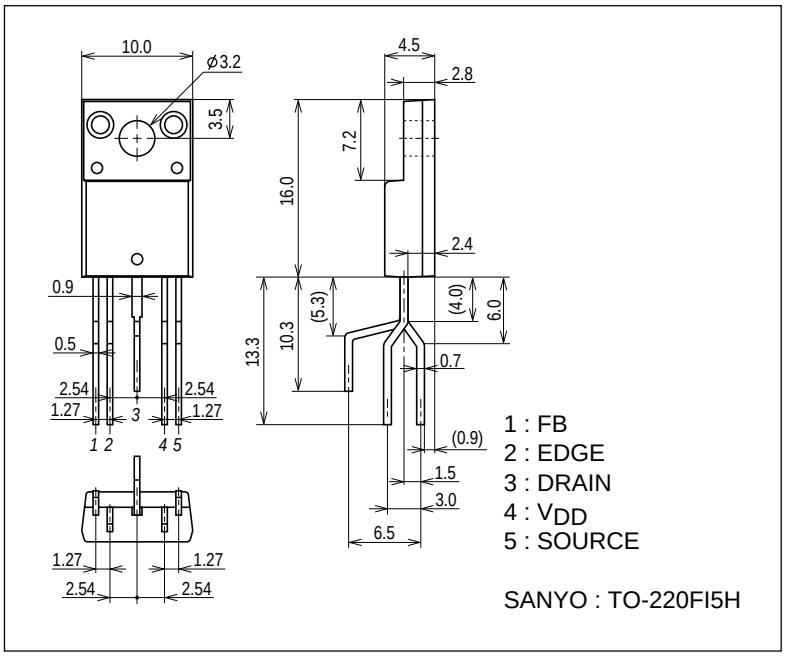
Electrical Characteristics at Ta=25°C

Parameter	Symbol	Conditions	Ratings			Unit
			min	typ	max	
[MOSFET]						
Drain-to-Source Breakdown Voltage	$V_{(BR)DSS}$	3-5 I_D=1mA, V_{DD}=0	650			V
Zero-Gate Voltage Drain Current	I_{DSS}	3-5 V_{DS}=650V, V_{DD}=0			1	mA
Static Drain-to-Source On-State Resistance	R_{DS}(on)	3-5 I_D=2.8A, V_{DD}=15V		1.2	1.6	Ω
Input Capacitance	Ciss	V_{DS}=20V, f=1MHz		1450		pF
Output Capacitance	Coss	V_{DS}=20V, f=1MHz		250		pF
[IC]						
Power Supply Line Breakdown Voltage	$V_{(BR)DD}$	4-5 I_{DD}=1mA, V_{FB}=0	16.7			V
Overvoltage Input Latch Shutdown Threshold Voltage	OVP	4-5	15.7	16.5	17.3	V
Burst Mode Start Threshold Voltage	VBon	4-5 V_{EDGE}=V_{DD}	15.2	16.0	16.8	V
Burst Mode Stop Threshold Voltage	VBoff	4-5 V_{EDGE}=V_{DD}	14.6	15.4	16.2	V
Burst Mode Hysteresis Voltage	ΔVB	4-5 V_{EDGE}=V_{DD}		0.6		V
Low Voltage Protection ReleaseThreshold Voltage (Latch Reset Threshold Voltage)	UVH	4-5	9.1	9.9	10.7	V
Low Voltage Protection Operation Threshold Voltage	UVL	4-5	8.0	8.8	9.6	V
Low Voltage Protection Hysteresis Voltage	ΔUV	4-5		1.1		V
Feedback Detection Threshold Voltage	V_{FB}	1-5	0.58	0.70	0.82	V
Edge Signal Release Threshold Voltage	V_{EDGE}-H	2-5	2.3	2.6	2.9	V
Edge Signal Detection Threshold Voltage	V_{EDGE}-L	2-5	1.6	1.9	2.2	V
Edge Signal Hysteresis Voltage	ΔV_{EDGE}	2-5		0.7		V
Reference Oscillation Frequency	fosc	3-5 V_{EDGE}=0	30	35	40	kHz
Maximum Oscillation Frequency	fmax	3-5	150	180	210	kHz
Power Supply Current (at start-up)	I_{DD}(on)	4-5		200		μA
Minimum ON Time	ton(min)	3-5		300		ns
Step Drive Voltage	tstep	3-5		200		ns
Step Drive Gate Voltage	VGstep	3-5		V_{DD}-5.7		V

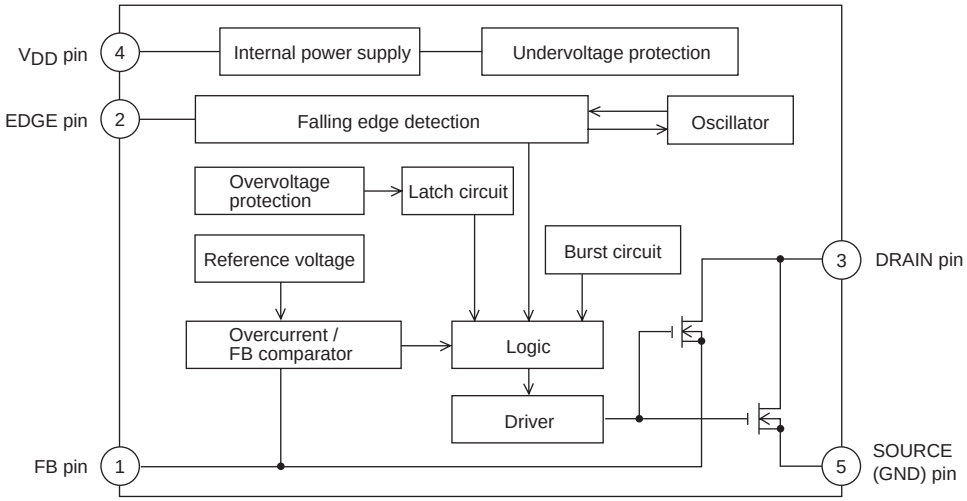
Package Dimensions

unit : mm

2249



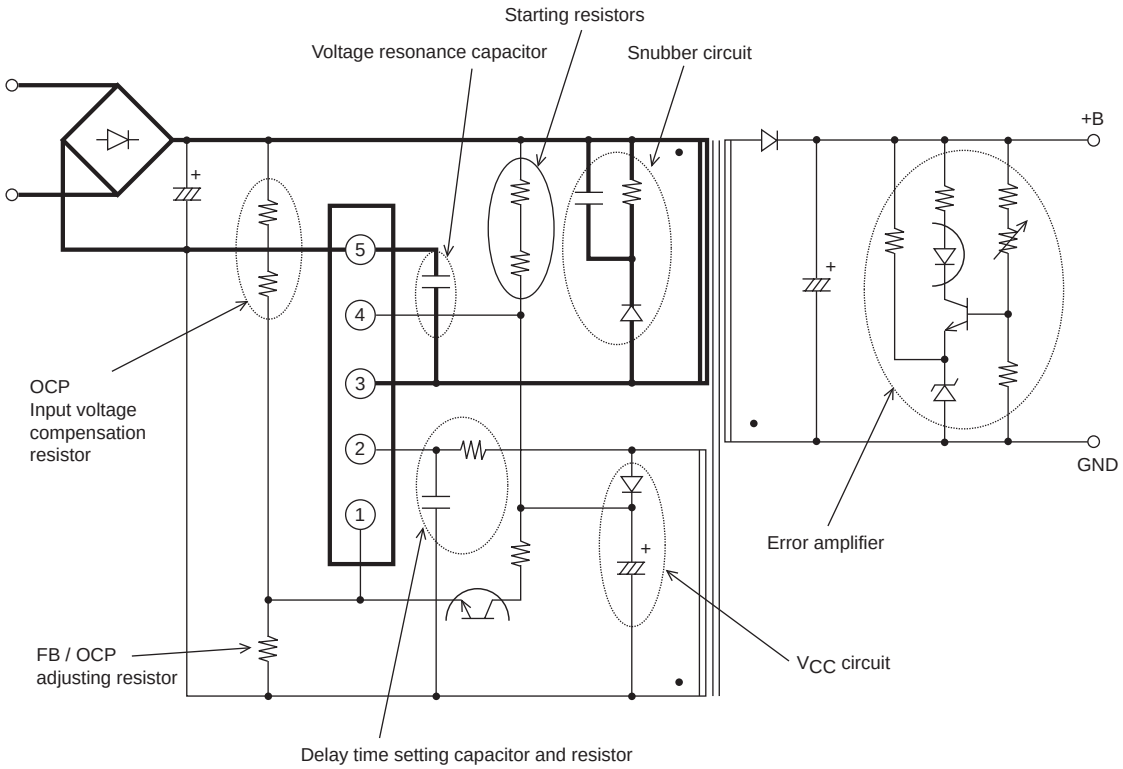
Block Diagram

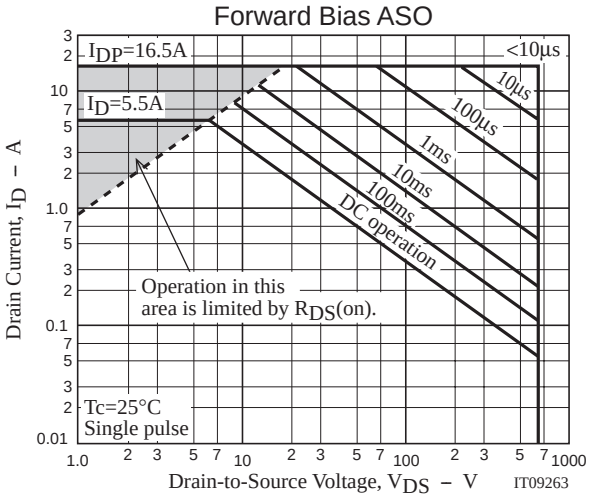


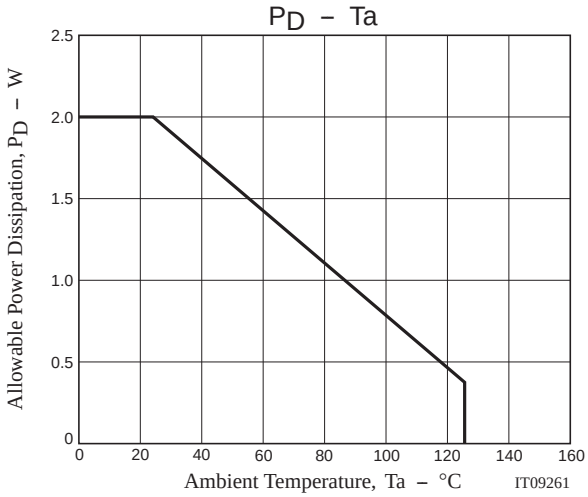
Pin Definitions and Functions

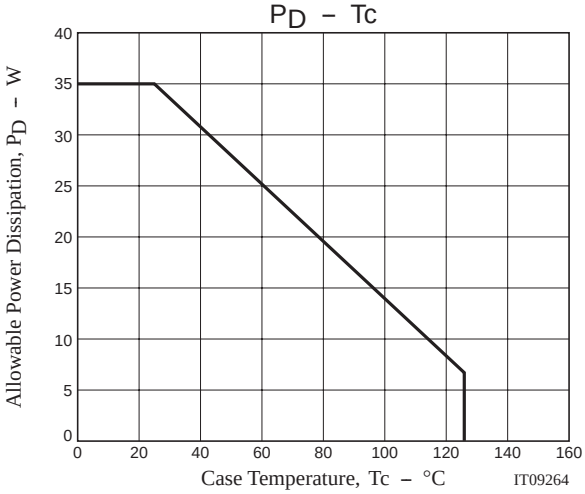
Pin No.	Symbol	Name	Function
1	FB	Overcurrent / feedback terminal	Overcurrent detection / voltage control input
2	EDGE	EDGE dtection terminal	Delay EDGE voltage input
3	DRAIN	DRAIN terminal	Power MOSFET drain
4	V_{DD}	Power supply terminal	Input for start-up voltage and drive voltage
5	SOURCE (GND)	Source (Ground) terminal	Power MOSFET source (ground)

Sample Application Circuit









- Specifications of any and all SANYO products described or contained herein stipulate the performance, characteristics, and functions of the described products in the independent state, and are not guarantees of the performance, characteristics, and functions of the described products as mounted in the customer's products or equipment. To verify symptoms and states that cannot be evaluated in an independent device, the customer should always evaluate and test devices mounted in the customer's products or equipment.
- SANYO Electric Co., Ltd. strives to supply high-quality high-reliability products. However, any and all semiconductor products fail with some probability. It is possible that these probabilistic failures could give rise to accidents or events that could endanger human lives, that could give rise to smoke or fire, or that could cause damage to other property. When designing equipment, adopt safety measures so that these kinds of accidents or events cannot occur. Such measures include but are not limited to protective circuits and error prevention circuits for safe design, redundant design, and structural design.
- In the event that any or all SANYO products(including technical data,services) described or contained herein are controlled under any of applicable local export control laws and regulations, such products must not be exported without obtaining the export license from the authorities concerned in accordance with the above law.
- No part of this publication may be reproduced or transmitted in any form or by any means, electronic or mechanical, including photocopying and recording, or any information storage or retrieval system, or otherwise, without the prior written permission of SANYO Electric Co., Ltd.
- Any and all information described or contained herein are subject to change without notice due to product/technology improvement, etc. When designing equipment, refer to the "Delivery Specification" for the SANYO product that you intend to use.
- Information (including circuit diagrams and circuit parameters) herein is for example only ; it is not guaranteed for volume production. SANYO believes information herein is accurate and reliable, but no guarantees are made or implied regarding its use or any infringements of intellectual property rights or other rights of third parties.

This catalog provides information as of March, 2005. Specifications and information herein are subject to change without notice.