

7.3 mΩ, 9 A GreenFET Load Switch with Discharge

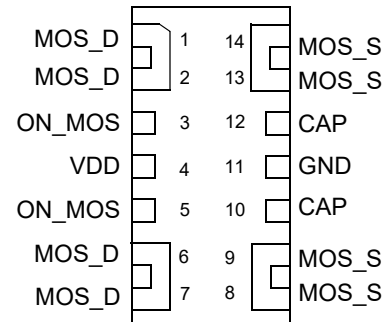
General Description

The SLG59M1568V is designed for load switching application. The part comes with one 9 A rated MOSFET switched on by an ON control pin. MOSFET turn on time is independently adjusted by an external capacitor.

Features

- One 9 A independent MOSFET
- Integrated VGS Charge Pump
- Internal discharge for gate and source
- User selectable ramp control by external capacitor
- Protected by thermal shutdown with current limit
- Pb-Free / RoHS Compliant
- Halogen-Free
- STDFN 14L, 1 x 3 x 0.55 mm

Pin Configuration

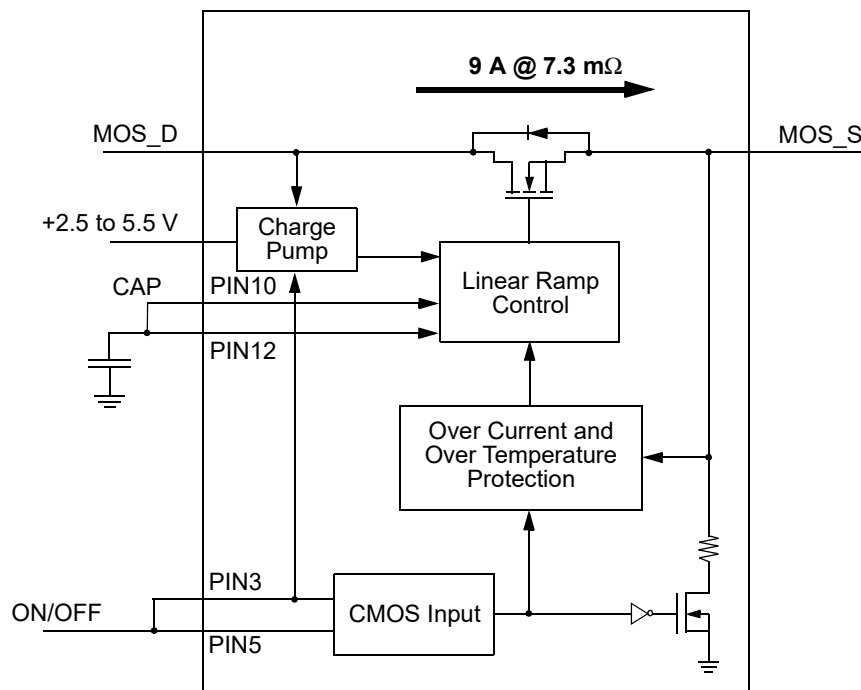


14-pin STDFN
(Top View)

Target Applications

- Consumer Electronics
 - Portable: Tablets, Notebooks
 - PCs and PC peripherals
- Commercial and Industrial Electronics
 - Printers
 - Servers
 - Embedded PCs
 - Data Communications Equipment

Block Diagram



Pin Description

Pin #	Pin Name	Type	Pin Description
1	MOS_D	MOSFET	Drain of MOSFET
2	MOS_D	MOSFET	Drain of MOSFET
3	ON_MOS	Input	Turns on MOS (4 MΩ pull down resistor). Tied to Pin 5 on PCB.
4	VDD	Power	VDD Power for Load Switch Control
5	ON_MOS	Input	Turns on MOS (4 MΩ pull down resistor). Tied to Pin 3 on PCB.
6	MOS_D	MOSFET	Drain of MOSFET
7	MOS_D	MOSFET	Drain of MOSFET
8	MOS_S	MOSFET	Source of MOSFET
9	MOS_S	MOSFET	Source of MOSFET
10	CAP	Input	Sets ramp and turn on time for MOSFET. Tied to Pin 12 on PCB.
11	GND	GND	Ground
12	CAP	Input	Sets ramp and turn on time for MOSFET. Tied to Pin 10 on PCB.
13	MOS_S	MOSFET	Source of MOSFET
14	MOS_S	MOSFET	Source of MOSFET

Ordering Information

Part Number	Type	Production Flow
SLG59M1568V	STDFN 14L	Industrial, -40 °C to 85 °C
SLG59M1568VTR	STDFN 14L (Tape and Reel)	Industrial, -40 °C to 85 °C

Absolute Maximum Ratings

Parameter	Description	Conditions	Min.	Typ.	Max.	Unit
V _{DD}	Power Supply		--	--	6	V
T _S	Storage Temperature		-65	--	150	°C
ESD _{HBM}	ESD Protection	Human Body Model	2000	--	--	V
W _{DIS}	Package Power Dissipation		--	--	1.2	W
I _{DS_MAX}	Max Operating Current				9	A
MOSFET I _{DS_PK}	Peak Current from Drain to Source	For no more than 10 continuous seconds out of every 100 seconds	--	--	12	A

Note: Stresses greater than those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. This is a stress rating only and functional operation of the device at these or any other conditions above those indicated in the operational sections of this specification is not implied. Exposure to absolute maximum rating conditions for extended periods may affect reliability.

Electrical Characteristics

T_A = -40 °C to 85 °C (unless otherwise stated)

Parameter	Description	Conditions	Min.	Typ.	Max.	Unit
V _{DD}	Power Supply Voltage		2.5	--	5.5	V
I _{DD}	Power Supply Current when OFF		--	0.1	1	μA
	Power Supply Current when ON		--	50	75	μA
RDS _{ON}	ON Resistance	T _A = 25°C; I _{DS} = 100 mA	--	7.3	9	mΩ
		T _A = 70°C; I _{DS} = 100 mA	--	8	11	mΩ
		T _A = 85°C; I _{DS} = 100 mA		8.5	11.5	mΩ
MOSFET I _{DS}	Current from Drain to Source	Continuous	--	--	9	A
V _{MOS_D}	Drain Voltage		1.0	5.0	V _{DD}	V
T _{ON_Delay}	ON Delay Time	50% ON to Ramp Begin	--	300	500	μs
T _{Total_ON}	Total Turn On Time	50% ON to 90% V _S	Configurable ¹			ms
		Example: CAP (Pin 10 & 12) share a single 4nF capacitor, V _{DD} = V _D = 5 V, C _{LOAD} = 10 μF, R _{LOAD} = 20 Ω	--	1.1	--	ms
V _{S(SR)}	Slew Rate	10% V _S to 90% V _S	Configurable ¹			V/ms
		Example: CAP (Pin 10 & 12) share a single 4nF capacitor, V _{DD} = V _D = 5 V, C _{LOAD} = 10 μF, R _{LOAD} = 20 Ω	--	6.0	--	V/ms
C _{LOAD}	Output Load Capacitance	C _{LOAD} connected from MOS_S to GND	--	--	1000	μF
R _{DIS}	Discharge Resistance		100	210	300	Ω
ON_V _{IH}	High Input Voltage on ON pin		0.85	--	V _{DD}	V
ON_V _{IL}	Low Input Voltage on ON pin		-0.3	0	0.3	V
I _{LIMIT}	Active Current Limit	MOSFET will automatically limit current when V _S > 250 mV	--	12.0	--	A
	Short Circuit Current Limit	MOSFET will automatically limit current when V _S < 250 mV	--	0.5	--	A
THERM _{ON}	Thermal shutoff turn-on temperature		--	125	--	°C
THERM _{OFF}	Thermal shutoff turn-off temperature		--	100	--	°C
THERM _{TIME}	Thermal shutoff time		--	--	1	ms

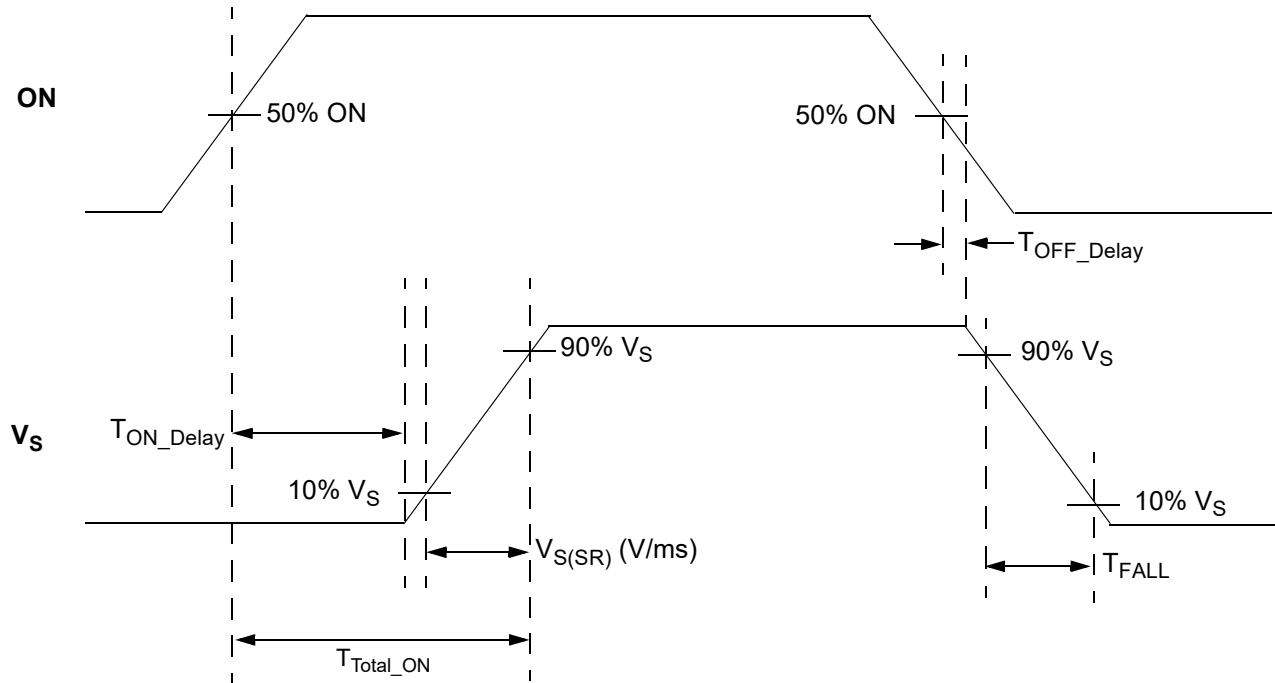
T_A = -40 °C to 85 °C (unless otherwise stated)

Parameter	Description	Conditions	Min.	Typ.	Max.	Unit
T _{OFF_Delay}	OFF Delay Time	50% ON to V _S Fall, V _{DD} = V _D = 5 V	--	--	15	μs

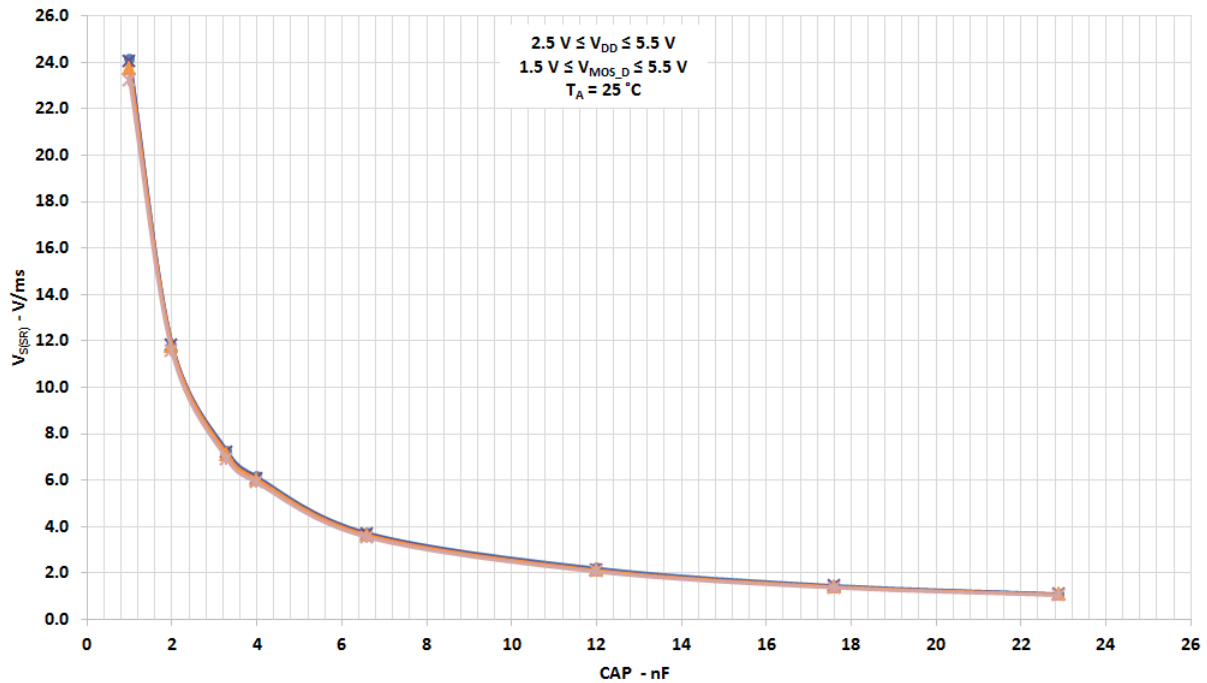
Notes:

1. Refer to table for configuration details.

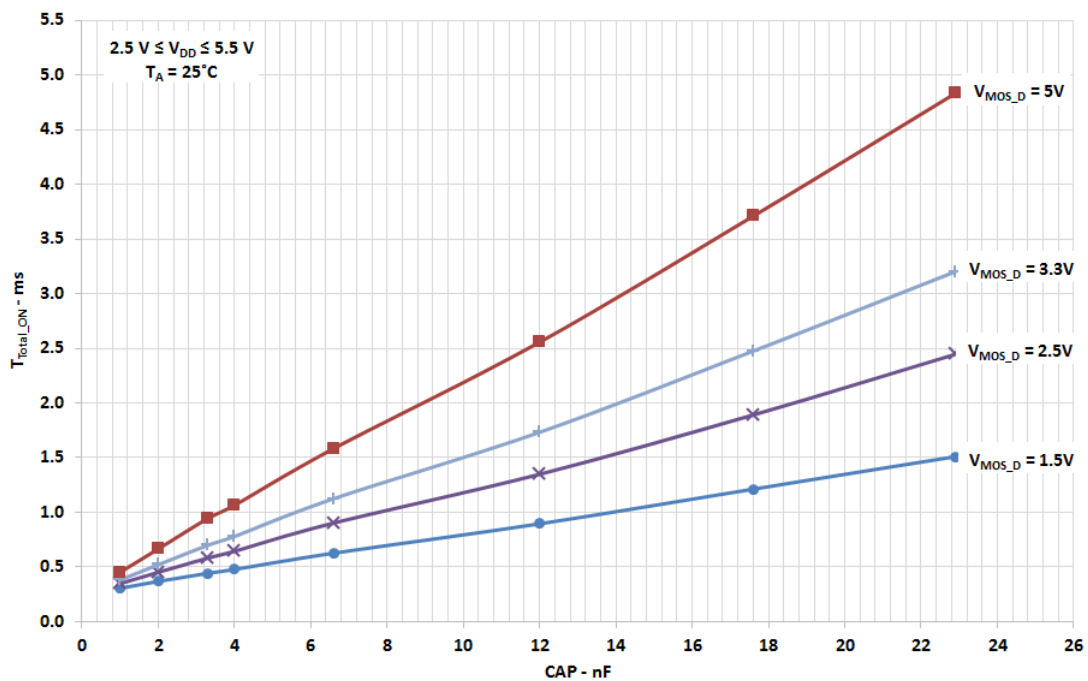
T_{Total_ON}, T_{ON_Delay} and Slew Rate Measurement



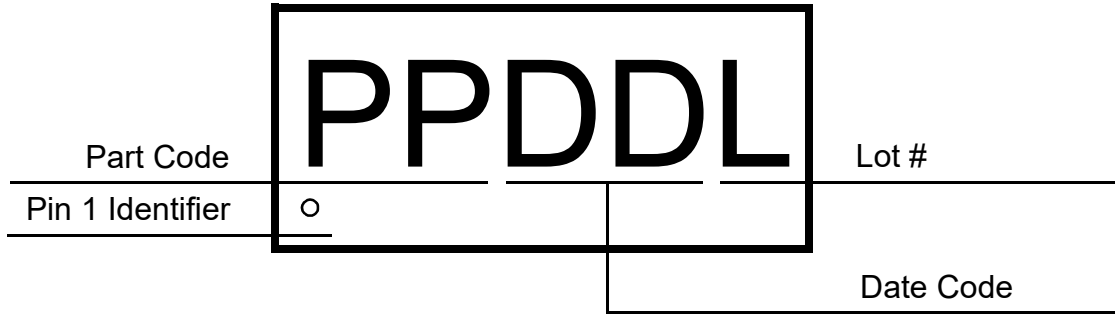
Slew Rate vs. CAP, V_{MOS_D} , and V_{DD}



T_{Total_ON} vs. CAP, V_{MOS_D} , and V_{DD}

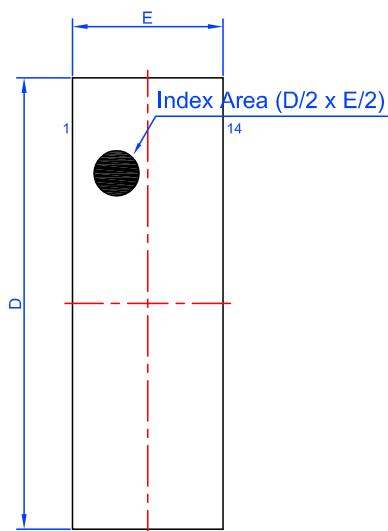


Package Top Marking System Definition

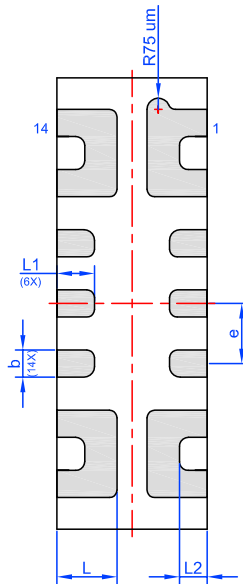


Package Drawing and Dimensions

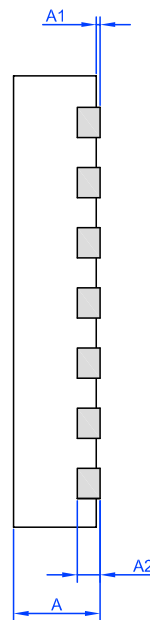
14 Lead STDFN Package 1 mm x 3 mm (Fused Lead)



Top View



BTM View



SIDE View

Unit: mm

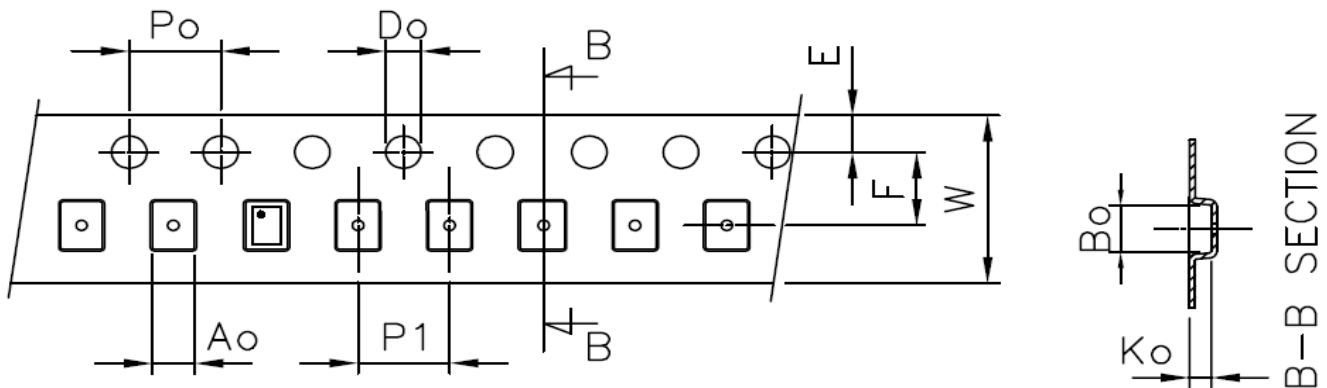
Symbol	Min	Nom.	Max	Symbol	Min	Nom.	Max
A	0.50	0.55	0.60	D	2.95	3.00	3.05
A1	0.005	-	0.050	E	0.95	1.00	1.05
A2	0.10	0.15	0.20	L	0.35	0.40	0.45
b	0.13	0.18	0.23	L1	0.20	0.25	0.30
e	0.40 BSC			L2	0.06	0.11	0.16

Tape and Reel Specifications

Package Type	# of Pins	Nominal Package Size	Units per Reel	Max Units per Box	Reel & Hub Size (mm)	Trailer A		Leader B		Pocket Tape (mm)	
						Pockets	Length (mm)	Pockets	Length (mm)	Width	Pitch
STDFN 14L 1x3mm 0.4P FC	14	1x3x0.55mm	3000	3000	178/60	100	400	100	400	8	4

Carrier Tape Drawing and Dimensions

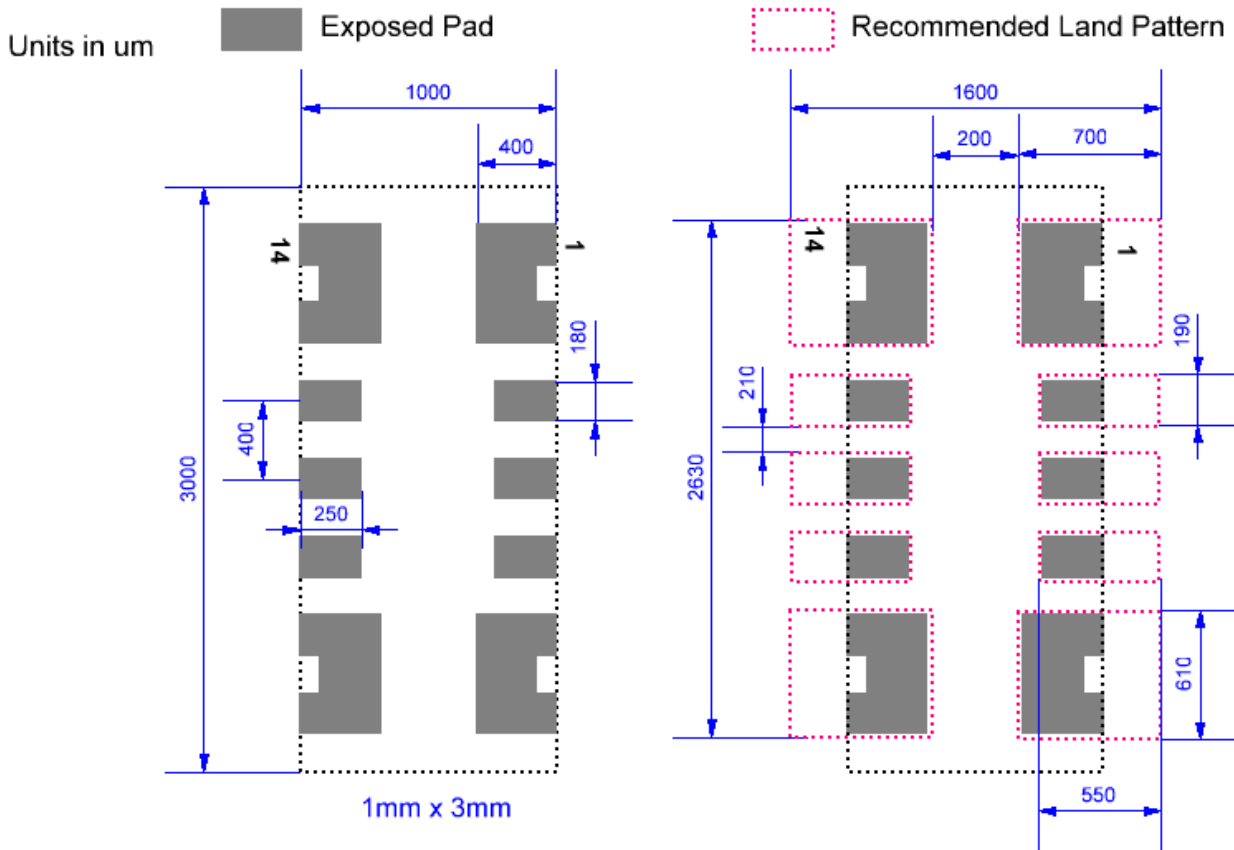
Package Type	Pocket BTM Length [mm]	Pocket BTM Width [mm]	Pocket Depth [mm]	Index Hole Pitch [mm]	Pocket Pitch [mm]	Index Hole Diameter [mm]	Index Hole to Tape Edge [mm]	Index Hole to Pocket Center [mm]	Tape Width [mm]
	A0	B0	K0	P0	P1	D0	E	F	W
STDFN 14L 1x3mm 0.4P FC	1.15	3.15	0.7	4	4	1.5	1.75	3.5	8



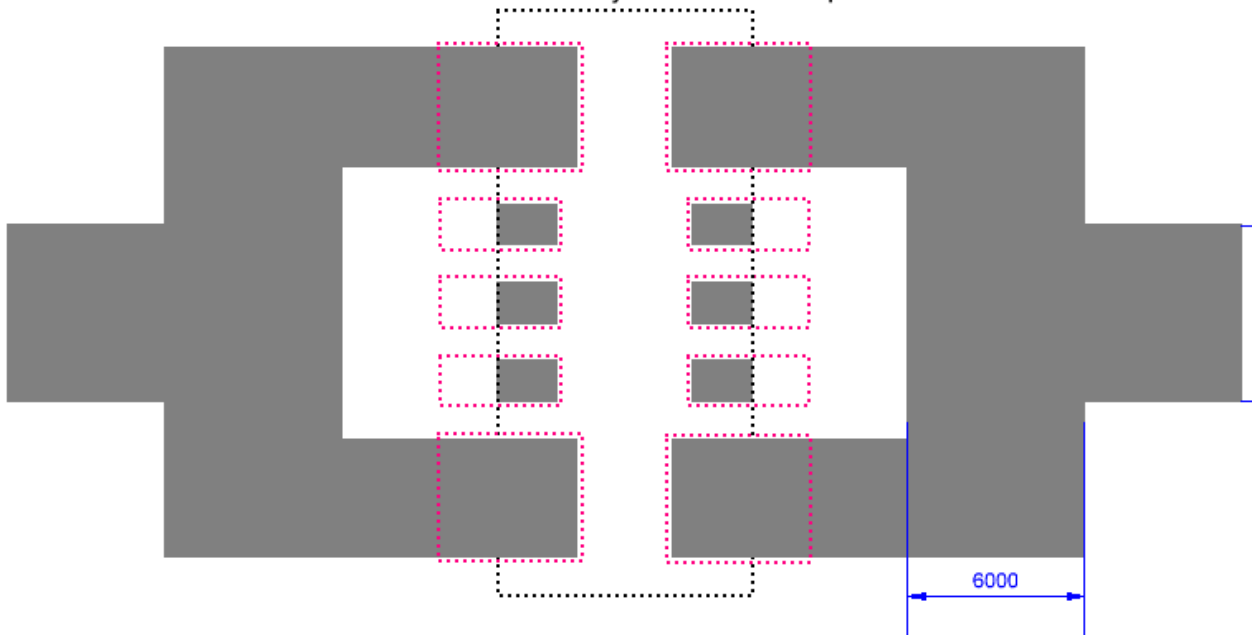
Recommended Reflow Soldering Profile

Please see IPC/JEDEC J-STD-020: latest revision for reflow profile based on package volume of 1.65 mm³ (nominal). More information can be found at www.jedec.org.

Recommended Land Pattern and PCB Layout



Recommended PCB Layout for external power traces



Revision History

Date	Version	Change
2/7/2022	1.06	Renesas rebranding Fixed typos
4/13/2018	1.05	Fixed typo in Block Diagram Fixed typo in Abs Max Table Clean up EC Table Parameters and Conditions Updated Charts
3/15/2016	1.04	Fixed RDSon values

IMPORTANT NOTICE AND DISCLAIMER

RENESAS ELECTRONICS CORPORATION AND ITS SUBSIDIARIES (“RENESAS”) PROVIDES TECHNICAL SPECIFICATIONS AND RELIABILITY DATA (INCLUDING DATASHEETS), DESIGN RESOURCES (INCLUDING REFERENCE DESIGNS), APPLICATION OR OTHER DESIGN ADVICE, WEB TOOLS, SAFETY INFORMATION, AND OTHER RESOURCES “AS IS” AND WITH ALL FAULTS, AND DISCLAIMS ALL WARRANTIES, EXPRESS OR IMPLIED, INCLUDING, WITHOUT LIMITATION, ANY IMPLIED WARRANTIES OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE, OR NON-INFRINGEMENT OF THIRD-PARTY INTELLECTUAL PROPERTY RIGHTS.

These resources are intended for developers who are designing with Renesas products. You are solely responsible for (1) selecting the appropriate products for your application, (2) designing, validating, and testing your application, and (3) ensuring your application meets applicable standards, and any other safety, security, or other requirements. These resources are subject to change without notice. Renesas grants you permission to use these resources only to develop an application that uses Renesas products. Other reproduction or use of these resources is strictly prohibited. No license is granted to any other Renesas intellectual property or to any third-party intellectual property. Renesas disclaims responsibility for, and you will fully indemnify Renesas and its representatives against, any claims, damages, costs, losses, or liabilities arising from your use of these resources. Renesas' products are provided only subject to Renesas' Terms and Conditions of Sale or other applicable terms agreed to in writing. No use of any Renesas resources expands or otherwise alters any applicable warranties or warranty disclaimers for these products.

(Disclaimer Rev.1.01 Jan 2024)

Corporate Headquarters

TOYOSU FORESIA, 3-2-24 Toyosu,
Koto-ku, Tokyo 135-0061, Japan
www.renesas.com

Trademarks

Renesas and the Renesas logo are trademarks of Renesas Electronics Corporation. All trademarks and registered trademarks are the property of their respective owners.

Contact Information

For further information on a product, technology, the most up-to-date version of a document, or your nearest sales office, please visit www.renesas.com/contact-us/.