



Public Products List

Public Products are off the shelf products. They are not dedicated to specific customers, they are available through ST Sales team, or Distributors, and visible on ST.com

PCN Title : VIPower Products (SO-8): Assembly and Final Test Transfer to Bouskoura (second wave)

PCN Reference : ADG/23/13915

Subject : Public Products List

Dear Customer,

Please find below the Standard Public Products List impacted by the change.

VN800PSTR-E	VN750SMPTR-E	VN750PSTR-E
-------------	--------------	-------------

IMPORTANT NOTICE – PLEASE READ CAREFULLY

Subject to any contractual arrangement in force with you or to any industry standard implemented by us, STMicroelectronics NV and its subsidiaries (“ST”) reserve the right to make changes, corrections, enhancements, modifications, and improvements to ST products and/or to this document at any time without notice. Purchasers should obtain the latest relevant information on ST products before placing orders. ST products are sold pursuant to ST’s terms and conditions of sale in place at the time of order acknowledgement.

Purchasers are solely responsible for the choice, selection, and use of ST products and ST assumes no liability for application assistance or the design of Purchasers’ products.

No license, express or implied, to any intellectual property right is granted by ST herein.

Resale of ST products with provisions different from the information set forth herein shall void any warranty granted by ST for such product.

ST and the ST logo are trademarks of ST. All other product or service names are the property of their respective owners.

Information in this document supersedes and replaces information previously supplied in any prior versions of this document.

PRODUCT/PROCESS CHANGE NOTIFICATION

TITLE	VIpower Products (SO-8): Assembly and Final Test Transfer to Bouskoura
IMPACTED PRODUCTS	VIpower products housed in SO-8 package. See enclosed list.
MANUFACT. STEP	Assembly and Final Testing
INVOLVED PLANT	Recipient: ST Shenzhen Plant (China) Destination: ST Bouskoura Plant (Morocco)
CHANGE REASON	ST Shenzhen SO8 package line closure June 30, 2023: Service and Capacity improvement for business continuity. Manufacturing process optimization.
CHANGE DESCRIPTION	Transfer of package assembly and Final testing from current Shenzhen (China) to Bouskoura (Morocco) Plant. Package Bill of Material is subject to upgrade as described in the following document.
TRACEABILITY	Dedicated Finished Good code (internal part number).
VALIDATION	According to ZVEI Delta Qualification Matrix corresponding to following selected items: <ul style="list-style-type: none"> ✚ SEM-PA-04 Change of lead frame finishing material / area (internal) ✚ SEM-PA-05 Change of lead and slug plating material /plating thickness (external) ✚ SEM-PA-18 Move all or parts of production to a different assembly site ✚ SEM-TF-01 Move of all or part of electrical wafer test and/or final test to a different test site <p>See following document for details and attached qualification report.</p>
CURRENT PRODUCTS	Replaced by new version featuring new Plant and upgraded package
REPORTS	Qualification performed on Test Vehicles enclosed to this communication



life.augmented

**VIPower® products in SO-8 package:
Assembly and Final Test Transfer to Bouskoura
(second wave)**

Agenda

3 Change Description

9 Product lines impacted

5 Lead Frame Options

10 Conclusions

7 Bill Of Material Comparison

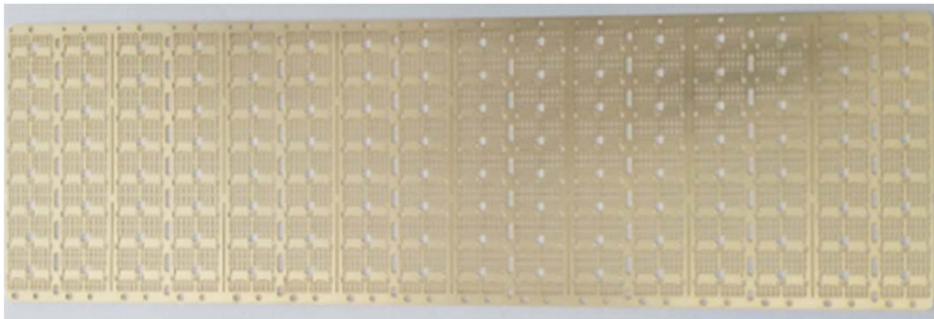
8 ZVEI Guidelines

Change description

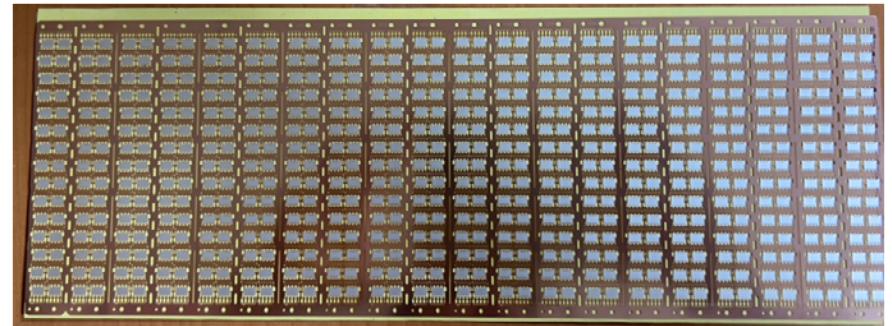
- Aim of this document is to describe the activity performed to qualify the VIPower® products assembled in SO-8 package with the **SuperSuperHighDensity** Lead Frame in Bouskoura ST plant.
- The new Lead Frame material **SuperSuperHighDensity** ensure the same quality and electrical characteristics the current products processed in Shenzhen ST plant with the **HighDensity** Lead Frame.
- All reliability tests have been completed with positive results.

SO8 Lead Frame Density comparison: High Density vs Super Super High Density

- **256** Units (8 rows, 32 columns) for each Leed Frame **High Density** in Shenzhen plant

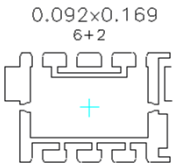


- **600** Units (15 rows, 40 columns) for each Leed Frame **Super Super High Density** in Bouskoura ST plant.



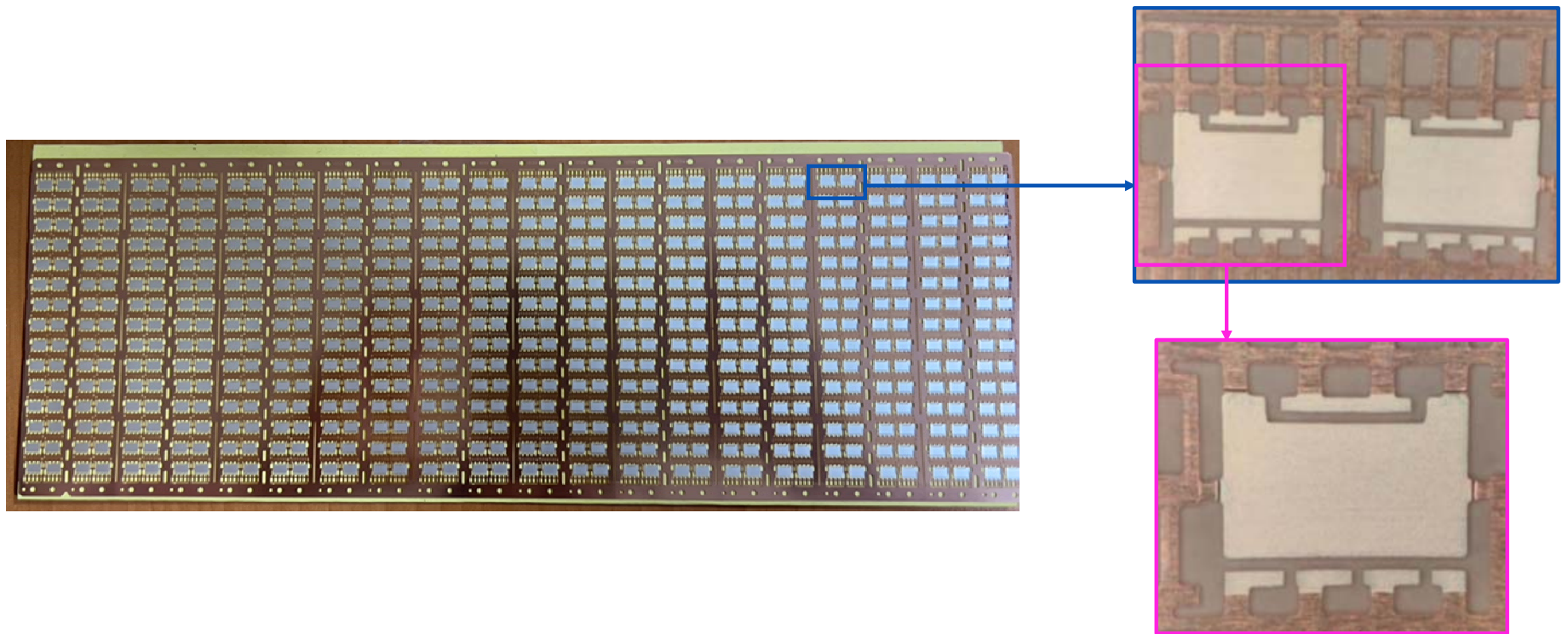
SO8 SSHD Lead Frame option

SO8 Lead Frame Option



Leadframe PN	FRAME SO 8L 92x169 6+2 SSHD 600uOpK SpAg
High Density in Shenzhen ST plant	OPT K
	PPF
Super Super High Density in Bouskoura ST plant	OPT K
	Spag

FRAME SO 8L 92x169 6+2 SSHD 600uOpK SpAg



Bill Of Material Comparison

SO 08 STRIP SINGLE ISLAND package

Actual Bill of Material in SHENZHEN plant	
ITEM	MATERIAL
WIRE	WIRE Cu D2 BL40-55g EL15-25%
FRAME	SO 8L 169x92 Mtx HD OpK NiThPdAgAu
DIE ATTACH	GLUE LOCTITE ABLESTIK QMI95072A1
MOLD COMPOUND	RESIN SUMITOMO EME-G700KC



Actual Bill of Material in BOUSKOURA plant	
ITEM	MATERIAL
WIRE	WIRE Cu D2 BL40-55g EL15-25%
FRAME	SO 8L 92x169 6+2 SSHD 600uOpK SpAg
DIE ATTACH	GLUE LOCTITE ABLESTIK QMI95072A1
MOLD COMPOUND	RESIN SUMITOMO EME-G700KC

VIpower® Product lines impacted

VIpower® Product lines in SO 08 STRIP SINGLE ISLAND package

- Commercial Product : VN800PSTR-E (Silicon Line VNT903)
VN800PSTR-61-E (Silicon Line VNT903)
- Commercial Product : VN750SMPTR-E (Silicon Line VNE801)
- Commercial Product : VN750PSTR-E (Silicon Line VNE701)

Conclusions

- Detailed qualification activity has been performed in order to qualify the VIPower® products assembled in SO-8 package with the **SuperSuperHighDensity** Lead Frame in Bouskoura ST plant.
- All reliability tests have been completed with positive results;
- This report shows the positive results achieved processing the VIPower® products assembled in SO-8 package and the **SuperSuperHighDensity** Lead Frame, ensuring the same quality and electrical characteristics as the current production in Shenzhen ST plant.

Reliability Evaluation Report

VIpower® MO3, MO5, M07 Technologies SO8 – ST Bouskoura (Morocco) Assembly plant

Note: this report is a summary of the reliability trials performed in good faith by STMicroelectronics in order to evaluate the electronic device conformance to its specific mission profile for Automotive Application. This report and its contents shall not be disclosed to a third party without previous written agreement from STMicroelectronics or under the approval of the author (see below).

Revision history

Rev.	Changes description	Author	Date
1	Full AEC-Q100 plan completed	A. Vilaro	12/12/2022

Approved by

Function	Location	Name	Date
Division Reliability Manager	ST Catania (Italy)	A. Marmoni	12/12/2022

TABLE OF CONTENTS

1	RELIABILITY EVALUATION OVERVIEW	3
1.1	OBJECTIVE.....	3
1.2	RELIABILITY STRATEGY AND TEST PLAN	3
1.2.1	<i>Reliability strategy</i>	<i>3</i>
1.2.2	<i>Test Plan</i>	<i>4</i>
1.3	CONCLUSION	5
2	PRODUCT CHARACTERISTICS	6
2.1	GENERALITIES.....	6
2.2	PINS CONNECTION.....	11
2.3	BLOCK DIAGRAM	12
2.4	BONDING DIAGRAM	13
2.5	TRACEABILITY	14
2.5.1	<i>Wafer Fab information.....</i>	<i>14</i>
2.5.2	<i>Assembly information.....</i>	<i>14</i>
2.5.3	<i>Reliability testing information.....</i>	<i>14</i>
3	TESTS RESULTS SUMMARY	15
3.1	LOTS INFORMATION.....	15
3.2	TEST RESULTS SUMMARY	16
	TERMS OF USE.....	20

1 RELIABILITY EVALUATION OVERVIEW

1.1 Objective

Aim of this report is to present the results of the reliability evaluation performed on selected test vehicles involving the VIPower®M03, MO5 and MO7 Technologies assembled in package SO8 with the new Super Super High Density (SSHD) lead frame in ST Bouskoura (Morocco) assembly plant.

The selected vehicles are:

- VIPower®M03 Technology:
 - o VNS3NV04DP-E (VNS6 as ST internal code)
 - o VNS14NV04P-E (VNT8 as ST internal code)
- VIPower®M05 technology:
 - o VN5160S-E (VNJ5 as ST internal code)
 - o VNLD5090E (VNY9 as ST internal code)
- VIPower®M07 technology:
 - o VN7040AS (XV14 as ST internal code)

1.2 Reliability Strategy and Test Plan

1.2.1 Reliability strategy

The reliability strategy was based on one diffusion lot per each test vehicles, involving different Wafer Fab locations, assembly each lot in the nominal (NN) Bonding Force and US Power condition as well as in the higher (HH) and lower (LL) case for a total amount of fifteen assembly lots.

The reliability evaluation is in agreement with ST 0061692 and AEC-Q100 rev. H Grade 1 requirements. For details on test conditions, generic data used, and specifications references refer to test results summary in section 3.

In the below table a comparison among AEC-Q100 and ZVEI requirements in case of assembly plant transfer and new frame introduction vs the applied ST plan is reported, no deviation occurred.

	Test Group A				Test Group B			Test Group C				Test Group D					Test Group E						
	THB	AC	TC	PTC	HTSL	HTOL	ELFR	WBS	WBP	SD	PD	EM	TDDB	HCI	NBTI	SM	HBM	CDM	LU	ED	EMC	SC	
AEC-Q100	x	x	x	x	x	x	x	x	x	x	x										x		
ZVEI	x	x	x	x	x	x	x	x	x	x	x										x		
ST	x	X	x	x	x	x	x	x	x	x	x										x		

1.2.2 Test Plan

AEC-Q100 TEST PLAN

TEST GROUP	TEST NAME	DESCRIPTION / COMMENTS	TEST FLAG
A Accelerated Environment Stress Tests	PC (JL3)	Preconditioning (JL3+3 reflows simulation)	Yes
	THB	Temperature Humidity Bias	Yes
	AC	Autoclave at 2atm	Yes
	TC	Temperature Cycling	Yes
	PTC	Power Temperature Cycling	Yes
	HTSL	High Temperature Storage Life	Yes
B Accelerated Lifetime Simulation Tests	HTOL	High Temperature Operating Life	Yes
	ELFR	Early Life Failure Rate	Yes
	EDR	Endurance Data Retention	Not Applicable
C Package Assembly Integrity Tests	WBS	Wire Bond Shear	Yes
	WBP	Wire Bond Pull	Yes
	SD	Solderability	Yes
	PD	Physical Dimension	Yes
	SBS	Solder Ball Shear	Not Applicable
	LI	Lead Integrity	Not Applicable
D Die Fabrication Reliability Tests	Test list is reported in section 5	Performed during process qualification	Not Applicable
E Electrical Verification Tests	ESD (HBM)	Electrostatic Discharge (Human Body Model)	Not Applicable
	ESD (CDM)	Electrostatic Discharge (Charged Device Model)	Not Applicable
	LU	Latch Up	Not Applicable
	ED	Electrical distribution	Yes
	FG	Fault grading	Not Applicable
	CHAR	Characterization	Not Applicable
	EMC	Electromagnetic Compatibility	Not Applicable
	SC	Short Circuit Characterization	Not Applicable
	SER	Soft Error Rate	Not Applicable
LF	Lead (Pb) Free: (see AEC-Q005)	Not Applicable	
F Defect Screening Tests	Test list is reported in section 5	To be implemented starting from first production lot	No
G Cavity Package Integrity Tests	Test list is reported in section 5	N/A: not for plastic packaged devices	Not Applicable

1.3 Conclusion

Reliability tests have been completed with positive results. Neither functional nor parametric rejects were detected at final electrical testing.

Relevant Destructive Physical Analysis (DPA) performed by means Wire Bond Pull/Shear tests (WBP, WBS) performed on each assembly lots (=assembly configuration) after the package oriented stress test pointed out neither abnormal break loads nor forbidden failure modes. The delamination check performed by means Scanning Acoustic Microscopy (SAM) analysis shows no significant delamination through the die-attach layer and its interfaces, nor on die-pad.

Based on the overall results obtained, the selected test vehicles designed in VIPower®M03, M05 and M07 technologies and assembled on SO8 package with the new SSHD frame in ST Bouskoura (Morocco) assembly plant, has positively passed reliability evaluation performed in agreement to AEC_Q100 Rev. H Grade 1 specification.

2. Product Characteristics

2.1. Generalities



VNS3NV04DP-E

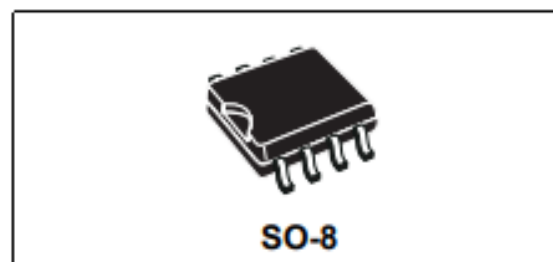
OMNIFET II

fully autoprotected Power MOSFET

Features

Max on-state resistance (per ch.)	R_{ON}	120 m Ω
Current limitation (typ)	I_{LIMH}	3.5 A
Drain-source clamp voltage	V_{CLAMP}	40 V

- ECOPACK[®]: lead free and RoHS compliant
- Automotive Grade: compliance with AEC guidelines
- Linear current limitation
- Thermal shutdown
- Short circuit protection
- Integrated clamp
- Low current drawn from input pin
- Diagnostic feedback through input pin
- ESD protection
- Direct access to the gate of the Power MOSFET (analog driving)
- Compatible with standard Power MOSFET



Description

The VNS3NV04DP-E device is made up of two monolithic chips (OMNIFET II) housed in a standard SO-8 package. The OMNIFET II is designed using STMicroelectronics™ VIPower™ M0-3 technology and is intended for replacement of standard Power MOSFETs in up to 50 kHz DC applications.

Built-in thermal shutdown, linear current limitation and overvoltage clamp protect the chip in harsh environments.

Fault feedback can be detected by monitoring voltage at the input pin

Table 1. Device summary

Package	Order codes	
	Tube	Tape and reel
SO-8	VNS3NV04DP-E	VNS3NV04DPTR-E



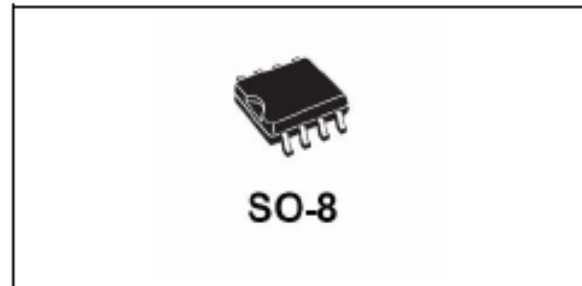
VNS14NV04P-E

"OMNIFET II"
fully autoprotected Power MOSFET

Features

Type	$R_{DS(on)}$	I_{lim}	V_{clamp}
VNS14NV04P-E	35 m Ω	12 A	40 V

- Linear current limitation
- Thermal shutdown
- Short circuit protection
- Integrated clamp
- Low current drawn from input pin
- Diagnostic feedback through input pin
- ESD protection
- Direct access to the gate of the Power MOSFET (analog driving)
- Compatible with standard Power MOSFET



Description

The VNS14NV04P-E is monolithic device made using STMicroelectronics™ VIPower™ M0 Technology, intended for replacement of standard Power MOSFETs in DC to 50 KHz applications. Built-in thermal shutdown, linear current limitation and overvoltage clamp protect the chip in harsh environments.

Fault feedback can be detected by monitoring the voltage at the input pin.

Table 1. Device summary

Package	Order codes	
	Tube	Tape and reel
SO-8	VNS14NV04P-E	VNS14NV04PTR-E



VN5160S-E

Single channel high side driver for automotive applications

Features

Max supply voltage	V_{CC}	41V
Operating voltage range	V_{CC}	4.5 to 36V
Max on-state resistance (per ch.)	R_{ON}	160 m Ω
Current limitation (typ)	I_{LIMH}	5.4 A
Off-state supply current	I_S	2 μ A ⁽¹⁾

1. Typical value with all loads connected

■ Main

- Inrush current active management by power limitation
- Very low stand-by current
- 3.0V CMOS compatible input
- Optimized electromagnetic emission
- Very low electromagnetic susceptibility
- In compliance with the 2002/95/EC european directive

■ Diagnostic Functions

- Open drain status output
- On-state open load detection
- Off-state open load detection
- Thermal shutdown indication

■ Protection

- Undervoltage shutdown
- Overvoltage clamp
- Output stuck to Vcc detection
- Load current limitation
- Self limiting of fast thermal transients
- Protection against loss of ground and loss of V_{CC}
- Thermal shutdown

Table 1. Device summary

Package	Order codes	
	Tube	Tape and reel
SO-8	VN5160S-E	VN5160STR-E



- Reverse battery protection (see [Figure 28](#))
- Electrostatic discharge protection

Applications

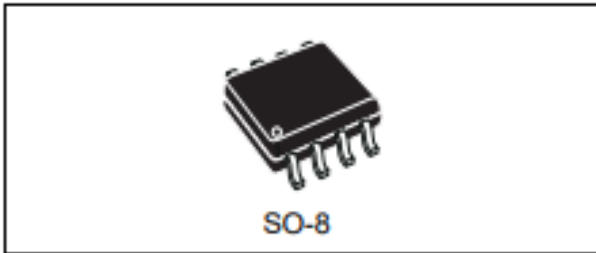
- All types of resistive, inductive and capacitive loads

Description

The VN5160S-E is a monolithic device made using STMicroelectronics VIPower MO-5 technology. It is intended for driving resistive or inductive loads with one side connected to ground. Active V_{CC} voltage clamp protects the device against low energy spikes. The device detects open load condition both in on and off-state, when STAT_DIS is left open or driven low. Output shorted to V_{CC} is detected in the off-state. When STAT_DIS is driven high, STATUS is in a high impedance condition. Output current limitation protects the device in overload condition. In case of long duration overload, the device limits the dissipated power to safe level up to thermal shutdown intervention. Thermal shutdown with automatic restart allows the device to recover normal operation as soon as fault condition disappears.

OMNIFET III fully protected low-side driver for automotive applications

Datasheet - production data



Description

The VNLD5090-E is a monolithic device made using STMicroelectronics VIPower technology, intended for driving resistive or inductive loads with one side connected to the battery. Built-in thermal shutdown protects the chip from overtemperature and short-circuit. Output current limitation protects the device in an overload condition. In case of long duration overload, the device limits the dissipated power to a safe level up to thermal shutdown intervention. Thermal shutdown, with automatic restart, allows the device to recover normal operation as soon as a fault condition disappears. Fast demagnetization of inductive loads is achieved at turn-off.

Features

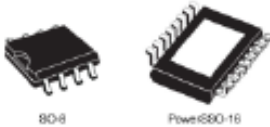
Type	V_{clamp}	$R_{\text{DS(on)}}$	I_{D}
VNLD5090-E	41 V	90 m Ω	25 A

- AEC-Q100 qualified
- Drain current: 13 A
- ESD protection
- Overvoltage clamp
- Thermal shutdown
- Current and power limitation
- Very low standby current
- Very low electromagnetic susceptibility
- In compliance with the 2002/95/EC European directive


Table 1. Device summary


Package	Order codes	
	Tube	Tape and reel
SO-8	VNLD5090-E	VNLD5090TR-E

High-side driver with MultiSense analog feedback for automotive applications



Features

Max transient supply voltage	V_{CC}	40 V
Operating voltage range	V_{CC}	4 to 28 V
Typ. on-state resistance (per Ch)	R_{ON}	40 m Ω
Current limitation (typ)	I_{LMH}	34 A
Standby current (max)	I_{STBY}	0.5 μ A

- AEC-Q100 qualified 
- General
 - Single channel smart high-side driver with MultiSense analog feedback
 - Very low standby current
 - Compatible with 3 V and 5 V CMOS outputs
- MultiSense diagnostic functions
 - Multiplexed analog feedback of: load current with high precision proportional current mirror, V_{CC} supply voltage and T_{CHIP} device temperature
 - Overload and short to ground (power limitation) indication
 - Thermal shutdown indication
 - OFF-state open-load detection
 - Output short to V_{CC} detection
 - Sense enable/disable
- Protections
 - Undervoltage shutdown
 - Overvoltage clamp
 - Load current limitation
 - Self limiting of fast thermal transients
 - Configurable latch-off on overtemperature or power limitation with dedicated fault reset pin
 - Loss of ground and loss of V_{CC}
 - Reverse battery with external components
 - Electrostatic discharge protection

Product status link

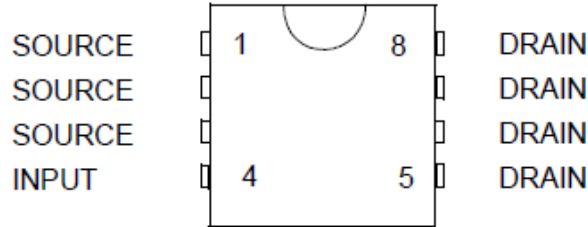
[VN7040AJ](#)
[VN7040AS](#)

Applications

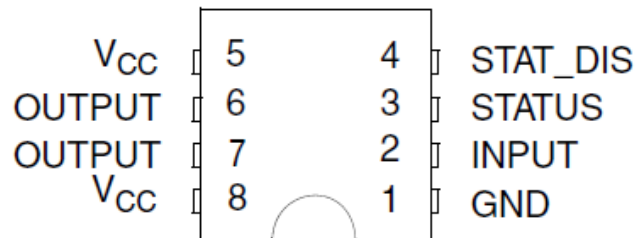
- All types of Automotive resistive, inductive and capacitive loads
- Specially intended for Automotive Turn Indicators (up to P27W or SAE1158 and R5W paralleled or LED Rear Combinations)
- Protected supply for ADAS systems: radars and sensors

2.2. pins connection

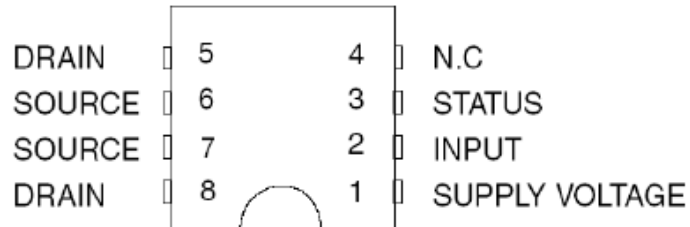
VNS3NV04DP-E, VNS14NV04P-E



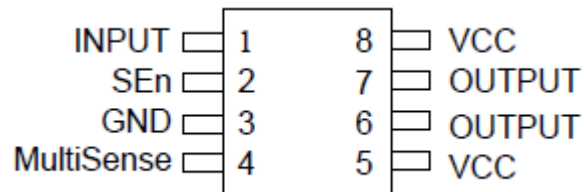
VN5160S-E



VNLD5090-E

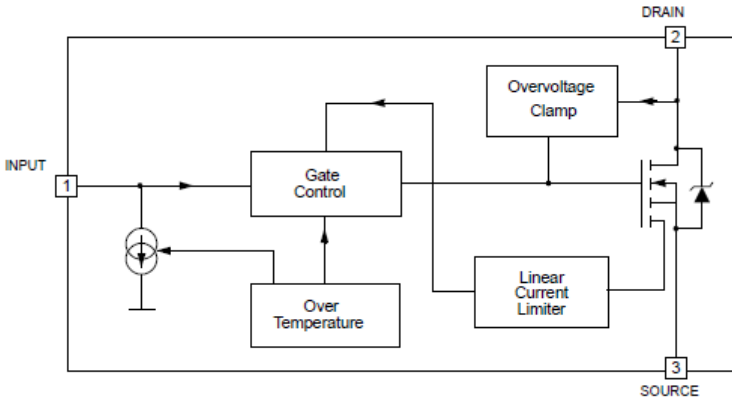


VN7040AS

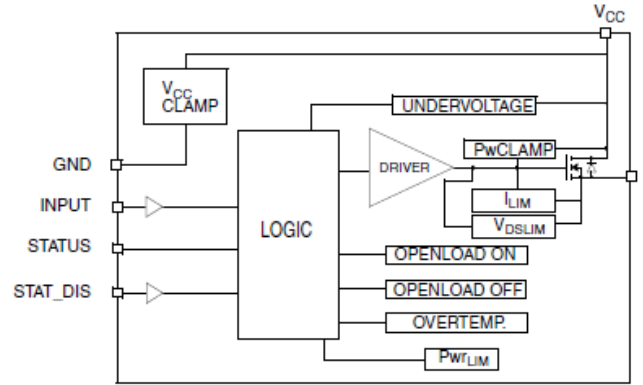


2.3. Block diagrams

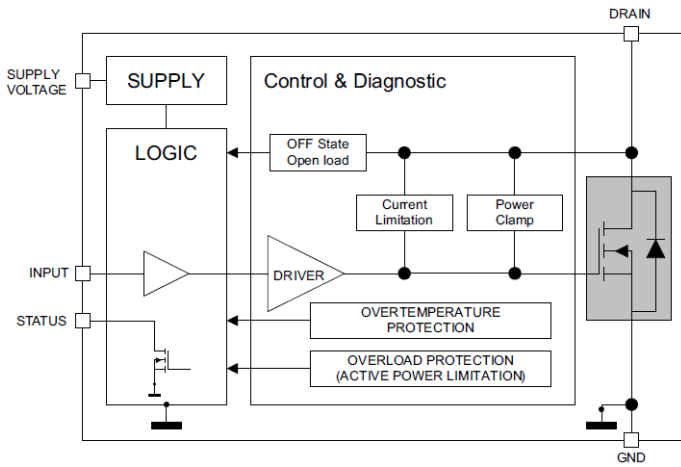
VNS3NV04DP-E, VNS14NV04P-E



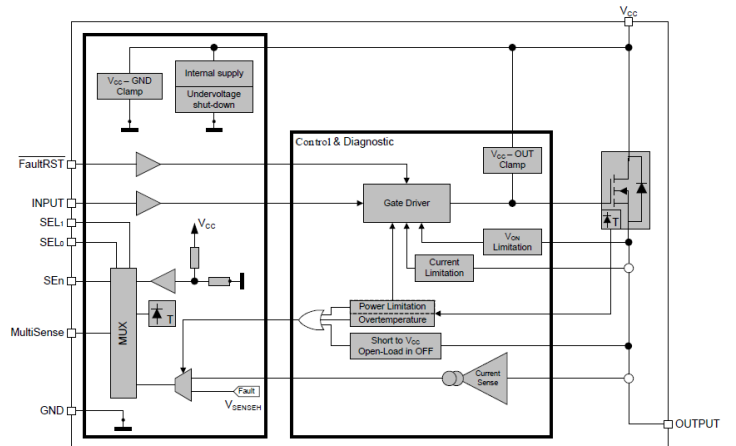
VN5160S-E



VNLD5090-E

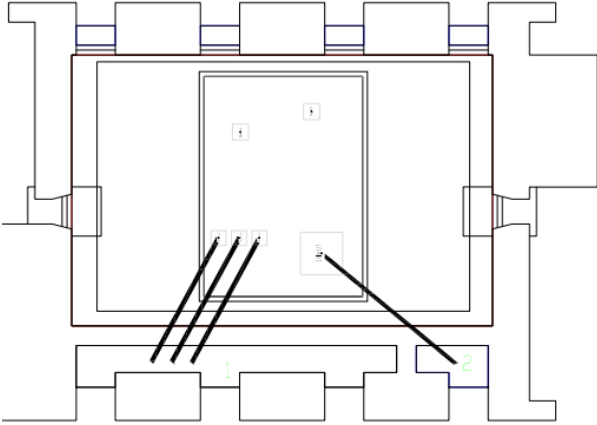


VN7040AS

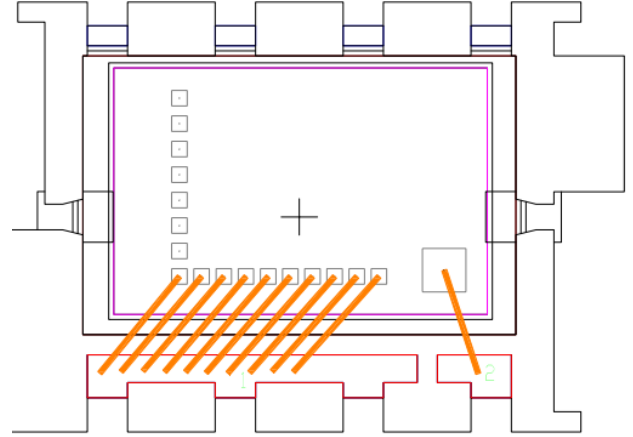


2.4. Bonding diagrams

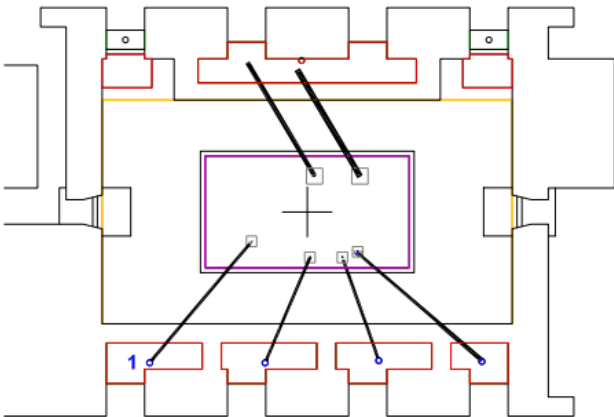
VNS3NV04DP-E



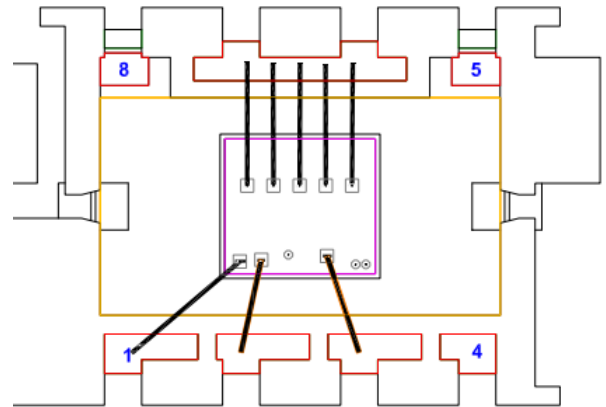
VNS14NV04P-E



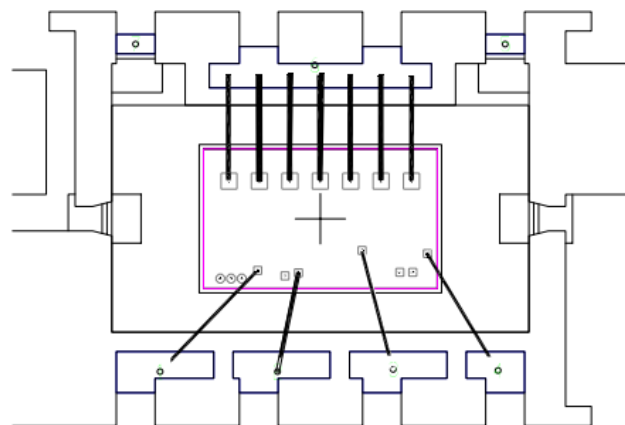
VN5160S-E



VNLD5090-E



VN7040AS



2.5 Traceability

2.5.1 Wafer Fab information

Commercial Product	VNS3NV04DP-E	VNS14NV04P-E	VN5160S-E	VNLD5090-E	VN7040AS
Wafer fab name / location	ST Singapore SG6			ST Singapore SG8	Catania (Italy) CTM8
Wafer diameter (inches)	6"			8"	
Silicon process technology	VIPower® M03		VIPower® M05		VIPower® MOL7
Line code	VNS6	VNT8	VNJ5	VNY9	XV14
Die finishing front side	SiN/POLYIMIDE			Teos+PTEos+SiOn+PIX	
Die finishing back side	Ti-Ni-Au				
Die size (micron)	2350 x 1720	2550 x 3810	2240 x 1270	1720 x 1550	2500 x 1530
Metal levels/ materials/ thicknesses	1 / AlSi / 3.2 µm		2 /Ti/TiN/Ti/AlSiCu 3.2 µm last	2 /Ti/TiN/TiAlCu 3.325 µm last	2 /Ti/TiN/Ti/AlCu/TiN 3.180 µm last

2.5.2 Assembly information

Commercial Product	VNS3NV04DP-E	VNS14NV04P-E	VN5160S-E	VNLD5090-E	VN7040AS
Assembly plant name / location	ST Bouskoura (Morocco)				
Package description	SO-08 STRIP DUAL ISLAND	SO-08 STRIP SINGLE ISLAND	SO-08 STRIP SINGLE ISLAND	SO-08 STRIP DUAL ISLAND	SO-08 STRIP SINGLE ISLAND
Lead frame description (material/thickness)	SO 8L 92x169 6+2 SSHD 600uOpK SpAg				
Die attach material	LOCTITE ABLESTIK QMI95072A1				
Wire bonding material/diameter	Cu D2		Cu D1, Cu D2	Cu D2	Cu D1, Cu D2
Molding compound material	SUMITOMO EME-G700KC D16mm				

2.5.3 Reliability Testing information

Reliability laboratory location	ST Bouskoura (Morocco), ST Catania (Italy)
---------------------------------	--

3 TESTS RESULTS SUMMARY

3.1 Lots Information

Lot #	Product	Diffusion Lot	Assembly Lot	Assembly configuration Bonding Force / US Power
1	VNS3NV04P-E VNS6	6205V76	CZ2251K702	N / N
			CZ2251K703	L / L
			CZ2251K701	H / H
2	VNS14NV04P-E VNT8	6209H41	CZ2325FG01	N / N
			CZ2325FG03	L / L
			CZ2325FG02	H / H
3	VN5160S-E VNJ5	6202HJF	CZ2346L601	N / N
			CZ2346NFRR	L / L
			CZ2346NF01	H / H
4	VNL5090S5-E VNY9	6205L1X	CZ2367YB03	N / N
			CZ2367YB02	L / L
			CZ2367YB01	H / H
5	VN7040AS XV14	5121FKC	CZ21705W01	N / N
			CZ21805V02	L / L
			CZ21805V01	H / H

3.2 Test results summary

Test method revision reference is the one active at the date of reliability trial execution.

TEST GROUP A – ACCELERATED ENVIRONMENT STRESS TESTS

Test	#	Reference	AEC-Q100 STM Test Conditions	Lots	S.S.	Total	Results FAIL/SS/Lots	Comments
PC	A1	JESD22-A113 J-STD-020	24h bake@125°C, including 5 Temperature Cycling Ta=-40°C/+60°C ACC MSL3 (40h@60C/60%RH) 3x Reflow simulation Peak Reflow Temp= 260°C 100 Temperature Cycling Ta=-55°C/+150°C	5	405	2025	0/450/5	Before THB/AC/TC/HTOL/PTC
THB	A2	JESD22 A101 JESD22 A110	Ta=85°C, 85%RH, Duration= 1000hrs	5	90	450	0/90/5	30 units / assembly lot (=assembly configuration)
AC	A3	JESD22 A102 or JESD22 A118 or JESD22- A101	ENV. SEQ. Environmental Sequence TC (Ta=-55°C / +150°C for 100 cycles) + AC (Ta=121°C, Pa=2atm for 96 hours)	5	90	450	0/90/5	30 units / assembly lot (=assembly configuration)
TC	A4	JESD22 A104	Ta=-55°C /+150 °C Duration= 1000 cycles	5	90	450	0/90/5	30 units / assembly lot (=assembly configuration)
PTC	A5	JESD22 A105	Ta=-40°C /+125 °C Duration=1000 cycles	1	45	45	0/45/1	Only for VN7040AS 15 units / assembly lot (=assembly configuration)
HTSL	A6	JESD22 A103	Ta= 150°C Duration= 1000hrs	5	90	450	0/90/5	30 units / assembly lot (=assembly configuration)

TEST GROUP B – ACCELERATED LIFETIME SIMULATION TESTS

Test	#	Reference	AEC-Q100 STM Test Conditions	Lots	S.S.	Total	Results FAIL/SS/Lots	Comments
HTOL	B1	JESD22 A108	Bias dynamic stress (OLT) Tj=150°C Duration= 1000hrs	5	90	450	0/90/5	30 units / assembly lot (=assembly configuration)
ELFR	B2	AEC-Q100-008	Ta max=150°C Duration=24hrs	-	-	-	-	Not Applicable
EDR	B3	AEC-Q100-005	Specific tests and conditions to be defined in case of NVM	-	-	-	-	Not Applicable

TEST GROUP C - PACKAGE ASSEMBLY INTEGRITY TESTS

Test	#	Reference	AEC-Q100 STM Test Conditions	Lots	S.S.	Total	Results FAIL/SS/Lots	Comments
WBS	C1	AEC-Q100-001 AEC-Q003	Wire Bond Shear: (Cpk > 1.67)	5	30 bond/minimum 5 units		All measurement within spec limits	Performed on all assembly lot (=assembly configuration)
WBP	C2	Mil-STD-883, Method 2011 AEC-Q003	Wire Bond Pull: (Cpk > 1.67)	5	30 bond/minimum 5 units		All measurement within spec limits	Performed on all assembly lot (=assembly configuration)
SD	C3	JESD22 B102 JSTD-002D	Solderability: (>95% coverage) 8hr steam aging prior to testing	5	15	75	All measurement within spec limits	Performed on all assembly lot (=assembly configuration)
PD	C4	JESD22 B100, JESD22 B108 AEC-Q003	Physical Dimensions: (Cpk > 1.67)	5	10	50	All measurement within spec limits	Performed on all assembly lot (=assembly configuration)
SBS	C5	AEC-Q100-010 AEC-Q003	Only for BGA package	-	-	-	-	Not Applicable
LI	C6	JESD22 B105	Not required for Surface Mount Devices	-	-	-	-	Not Applicable

TEST GROUP D – DIE FABRICATION RELIABILITY TESTS

Test	#	Reference	AEC-Q100 STM Test Conditions	Lots	S.S.	Total	Results FAIL/SS/Lots	Comments
EM	D1	JESD61	Data, test method and criteria available upon request	-	-	-	-	Not Applicable
TDDb	D2	JESD35	Data, test method and criteria available upon request	-	-	-	-	
HCI	D3	JESD60 & 28	Data, test method and criteria available upon request	-	-	-	-	
NBTI	D4	JESD90	Data, test method and criteria available upon request	-	-	-	-	
SM	D5	JESD61, 87, & 202	Data, test method and criteria available upon request	-	-	-	-	

GROUP E – ELECTRICAL VERIFICATION

Test	#	Reference	AEC-Q100 STM Test Conditions	Lots	S.S.	Total	Results FAIL/SS/Lots	Comments
TEST	E1	User/Supplier Specification	Pre and Post Stress Electrical Test	All	All	All	Passed	All parametric and functional tests
HBM	E2	AEC-Q100-002	Target: $\pm 2\text{kV}$	-	-	-	-	Not Applicable
CDM	E3	AEC-Q100-011	Target: $\pm 750\text{V}$ on corner pins	-	-	-	-	Not Applicable
LU	E4	AEC-Q100-004	Current Injection Class II – Level A (+/-)	-	-	-	-	Not Applicable
ED	E5	AEC-Q100-009 AEC-Q003	Electrical Distributions: (Test @ Rm/Hot/Cold) (where	5	30	150	All measurement within spec	
EMC	E9	SAE J1752/3	Electromagnetic Compatibility (Radiated Emissions)	-	-	-	-	Not Applicable
SC	E10	AEC Q100-012	Short Circuit Characterization	-	-	-	-	Not Applicable
SER	E11	JESD89-1 JESD89-2 JESD89-3	Applicable to devices with memory	-	-	-	-	Not Applicable
LF	E12	AEC-Q005	Lead (Pb) Free: (see AEC-Q005)	-	-	-	-	Not Applicable

TEST GROUP F – DEFECT SCREENING TESTS

Test	#	Reference	AEC-Q100 STM Test Conditions	Lots	S.S.	Total	Results FAIL/SS/Lots	Comments
PAT	F1	AEC-Q001	Process Average Testing: (see AEC-Q001)	Not performed on qualification lots. It will be implemented starting from first production lot				
SBA	F2	AEC-Q002	Statistical Bin/Yield Analysis: (see AEC-Q002)					

TEST GROUP G – CAVITY PACKAGE INTEGRITY TESTS

Test	#	Reference	AEC-Q100 STM Test Conditions	Lots	S.S.	Total	Results FAIL/SS/Lots	Comments
MS	G1	JESD22 B104	Mechanical Shock	Not Applicable: not for plastic packaged devices				
VFV	G2	JESD22 B103	Variable Frequency Vibration					
CA	G3	MIL-STD-883 Method 2001	Constant Acceleration					
GFL	G4	MIL-STD-883 Method 1014	Gross and Fine Leak					
DROP	G5		Drop Test, Package Drop					
LT	G6	MIL-STD-883 Method 2004	Lid Torque					
DS	G7	MIL-STD-883 Method 2019	Die Shear					
IWV	G8	MIL-STD-883 Method 1018	Internal Water Vapor					

TERMS OF USE

BY ACCEPTING THIS REPORT, YOU AGREE TO THE FOLLOWING TERMS OF USE:

This Reliability Evaluation Report (the "Report") and all information contained herein is the property of STMicroelectronics ("ST") and is provided solely for the purpose of obtaining general information relating to an ST product. Accordingly, you hereby agree to make use of this Report solely for the purpose of obtaining general information relating to the ST product. You further acknowledge and agree that this Report may not be used in or in connection with any legal or administrative proceeding in any court, arbitration, agency, commission or other tribunal or in connection with any action, cause of action, litigation, claim, allegation, demand or dispute of any kind. You further acknowledge and agree that this Report shall not be construed as an admission, acknowledgement or evidence of any kind, including, without limitation, as to the liability, fault or responsibility whatsoever of ST or any of its affiliates, or as to the accuracy or validity of the information contained herein, or concerning any alleged product issue, failure, or defect. ST does not promise that this Report is accurate or error free and specifically disclaims all warranties, express or implied, as to the accuracy of the information contained herein. Accordingly, you agree that in no event will ST or its affiliates be liable to you for any direct, indirect, consequential, exemplary, incidental, punitive, or other damages, including lost profits, arising from or relating to your reliance upon or use of this Report. You further acknowledge and agree that the use of this Report in violation of these Terms of Use would cause immediate and irreparable harm to ST which could not adequately be remedied by damages. You therefore agree that injunctive relief is an appropriate remedy to enforce these Terms of Use.

Disclosure of this document to any non-authorized party must be previously authorized by ST only under the provision of a proper confidentiality contractual arrangement executed between ST and you and must be treated as strictly confidential.

At all times you will comply with the following security rules:

- Do not copy or reproduce all or part of this document
- Keep this document locked away
- Further copies can be provided on a "need to know basis", Please contact your local ST Sales Office or document writer

Purchasers should obtain the latest relevant information on ST products before placing orders. ST products are sold pursuant to ST's terms and conditions of sale in place at the time of order acknowledgement, including, without limitation, the warranty provisions thereunder.

In that respect please note that ST products are not designed for use in some specific applications or environments described in above mentioned terms and conditions.

Purchasers are solely responsible for the choice, selection, and use of ST products and ST assumes no liability for application assistance or the design of Purchasers' products.

Information furnished is believed to be accurate and reliable. However, ST assumes no responsibility for the consequences of use of such information nor for any infringement of patents or other rights of third parties which may result from its use. No license, express or implied, to any intellectual property right is granted by ST herein.

ST and ST logo are trademarks of ST. All other product or service names are the property of their respective owners.

Information in this document supersedes and replaces information previously supplied in any prior version of this document.

©2022 STMicroelectronics – All rights reserved