

## FDMC86116LZ-VB Datasheet

### N-Channel 100-V (D-S) MOSFET

#### PRODUCT SUMMARY

$V_{(BR)DSS}$ (V)	$r_{DS(on)}$ ( $\Omega$ )	$I_D$ (A)
100	0.010 at $V_{GS} = 10$ V	50

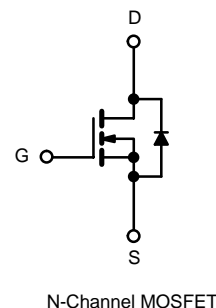
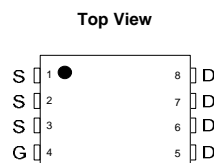
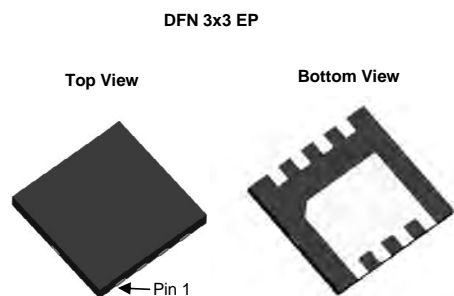
#### FEATURES

- Trench Power MOSFET
- 175 °C Junction Temperature
- Low Thermal Resistance Package
- 100 %  $R_g$  Tested


**RoHS**  
 COMPLIANT

#### APPLICATIONS

- Isolated DC/DC Converters



#### ABSOLUTE MAXIMUM RATINGS $T_C = 25$ °C, unless otherwise noted

Parameter	Symbol	Limit	Unit
Drain-Source Voltage	$V_{DS}$	100	V
Gate-Source Voltage	$V_{GS}$	$\pm 20$	
Continuous Drain Current ( $T_J = 175$ °C)	$I_D$	50	A
		45	
Pulsed Drain Current	$I_{DM}$	60	
Avalanche Current	$I_{AS}$	51	
Single Pulse Avalanche Energy <sup>b</sup>	$E_{AS}$	60	mJ
Maximum Power Dissipation <sup>b</sup>	$P_D$	355 <sup>c</sup>	W
		3.35	
Operating Junction and Storage Temperature Range	$T_J, T_{stg}$	- 55 to 175	°C

#### THERMAL RESISTANCE RATINGS

Parameter	Symbol	Limit	Unit
Junction-to-Ambient	$R_{thJA}$	40	°C/W
Junction-to-Case (Drain)	$R_{thJC}$	0.4	

Notes:

a. Package limited.

b. Duty cycle  $\leq 1$  %.

c. See SOA curve for voltage derating.

d. When Mounted on 1" square PCB (FR-4 material).

SPECIFICATIONS T <sub>J</sub> = 25 °C, unless otherwise noted						
Parameter	Symbol	Test Conditions	Min.	Typ.	Max.	Unit
Static						
Drain-Source Breakdown Voltage	V <sub>(BR)DSS</sub>	V <sub>DS</sub> = 0 V, I <sub>D</sub> = 250 μA	100			V
Gate-Threshold Voltage	V <sub>GS(th)</sub>	V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> = 250 μA	2		4	
Gate-Body Leakage	I <sub>GSS</sub>	V <sub>DS</sub> = 0 V, V <sub>GS</sub> = ± 20 V			± 100	nA
Zero Gate Voltage Drain Current	I <sub>DSS</sub>	V <sub>DS</sub> = 100 V, V <sub>GS</sub> = 0 V			1	μA
		V <sub>DS</sub> = 100 V, V <sub>GS</sub> = 0 V, T <sub>J</sub> = 125 °C			50	
		V <sub>DS</sub> = 100 V, V <sub>GS</sub> = 0 V, T <sub>J</sub> = 175 °C			250	
On-State Drain Current <sup>a</sup>	I <sub>D(on)</sub>	V <sub>DS</sub> ≥ 5 V, V <sub>GS</sub> = 10 V	120			A
Drain-Source On-State Resistance <sup>a</sup>	r <sub>DS(on)</sub>	V <sub>GS</sub> = 10 V, I <sub>D</sub> = 30 A		0.010		Ω
		V <sub>GS</sub> = 10 V, I <sub>D</sub> = 30 A, T <sub>J</sub> = 125 °C		0.013		
		V <sub>GS</sub> = 10 V, I <sub>D</sub> = 30 A, T <sub>J</sub> = 175 °C		0.027		
Forward Transconductance <sup>a</sup>	g <sub>fs</sub>	V <sub>DS</sub> = 15 V, I <sub>D</sub> = 30 A	25			S
Dynamic <sup>b</sup>						
Input Capacitance	C <sub>iss</sub>	V <sub>GS</sub> = 0 V, V <sub>DS</sub> = 25 V, f = 1 MHz		3200		pF
Output Capacitance	C <sub>oss</sub>			410		
Reverse Transfer Capacitance	C <sub>rss</sub>			210		
Total Gate Charge <sup>c</sup>	Q <sub>g</sub>	V <sub>DS</sub> = 100 V, V <sub>GS</sub> = 10 V, I <sub>D</sub> = 58 A		90	130	nC
Gate-Source Charge <sup>c</sup>	Q <sub>gs</sub>			23		
Gate-Drain Charge <sup>c</sup>	Q <sub>gd</sub>			34		
Gate Resistance	R <sub>g</sub>		0.5	1.3	3.1	Ω
Turn-On Delay Time <sup>c</sup>	t <sub>d(on)</sub>	V <sub>DD</sub> = 100 V, R <sub>L</sub> = 1.5 Ω I <sub>D</sub> ≅ 58 A, V <sub>GEN</sub> = 10 V, R <sub>g</sub> = 2.5 Ω		24	35	ns
Rise Time <sup>c</sup>	t <sub>r</sub>			220	330	
Turn-Off Delay Time <sup>c</sup>	t <sub>d(off)</sub>			45	70	
Fall Time <sup>c</sup>	t <sub>f</sub>			200	300	
Source-Drain Diode Ratings and Characteristics T <sub>C</sub> = 25 °C <sup>b</sup>						
Continuous Current	I <sub>S</sub>				58	A
Pulsed Current	I <sub>SM</sub>				110	
Forward Voltage <sup>a</sup>	V <sub>SD</sub>	I <sub>F</sub> = 58 A, V <sub>GS</sub> = 0 V		1.0	1.5	V
Reverse Recovery Time	t <sub>rr</sub>	I <sub>F</sub> = 30 A, di/dt = 100 A/μs		130	200	ns
Peak Reverse Recovery Current	I <sub>RM(REC)</sub>			8	12	A
Reverse Recovery Charge	Q <sub>rr</sub>				0.52	1.2

Notes:

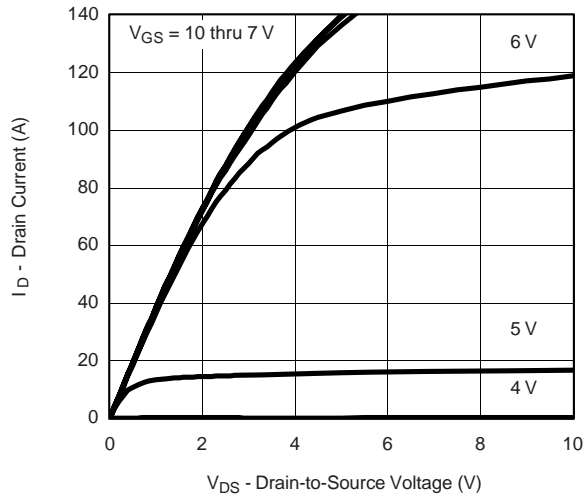
a. Pulse test; pulse width  $\leq 300\text{ }\mu\text{s}$ , duty cycle  $\leq 2\%$ .

b. Guaranteed by design, not subject to production testing.

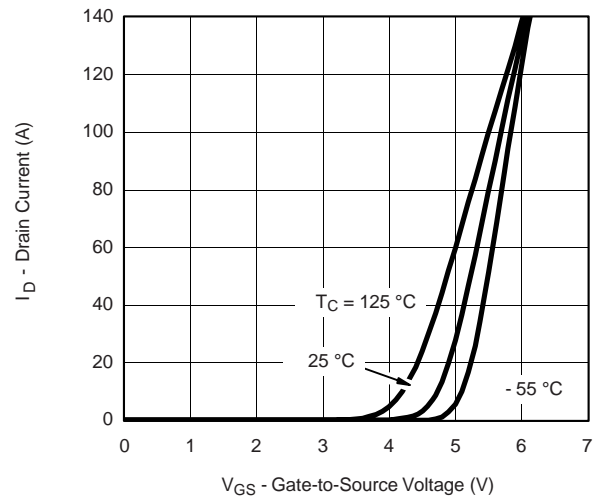
c. Independent of operating temperature.

Stresses beyond those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated in the operational sections of the specifications is not implied. Exposure to absolute maximum rating conditions for extended periods may affect device reliability.

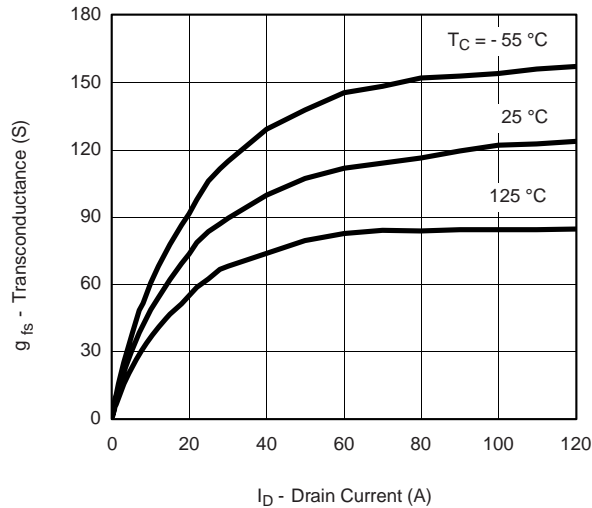
**TYPICAL CHARACTERISTICS** 25 °C, unless otherwise noted



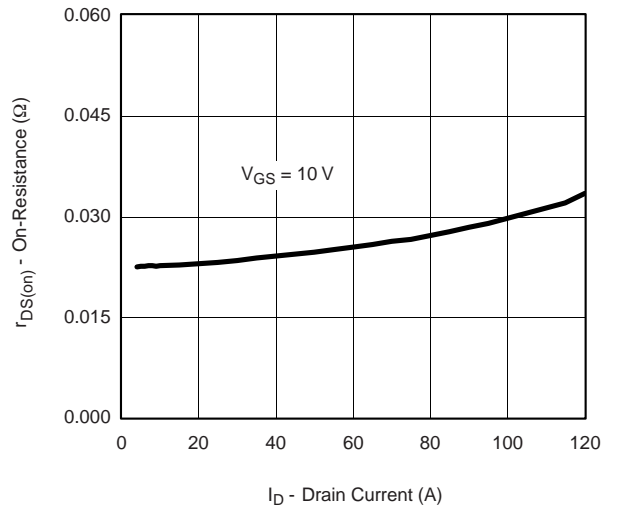
**Output Characteristics**



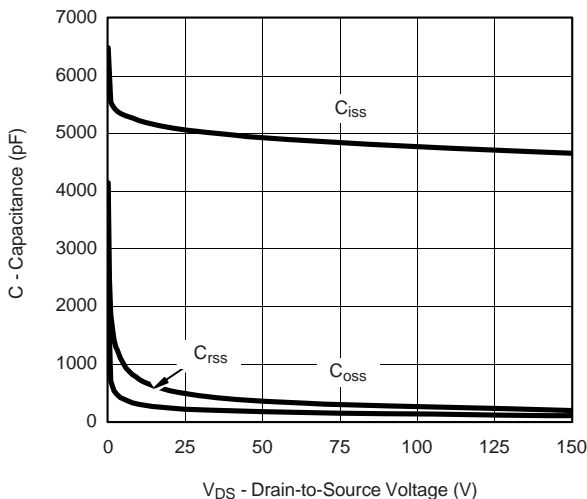
**Transfer Characteristics**



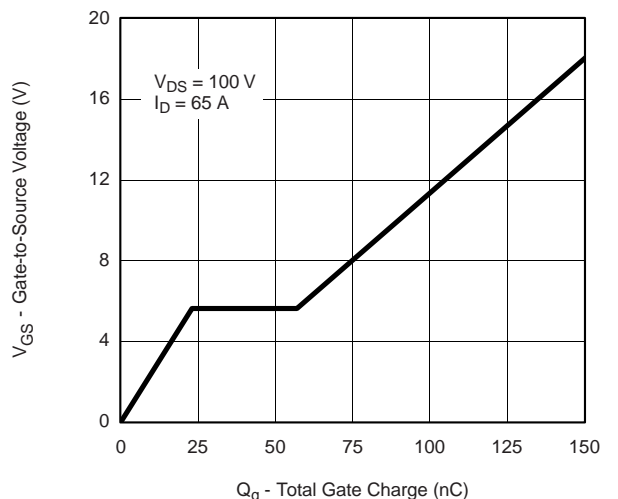
**Transconductance**



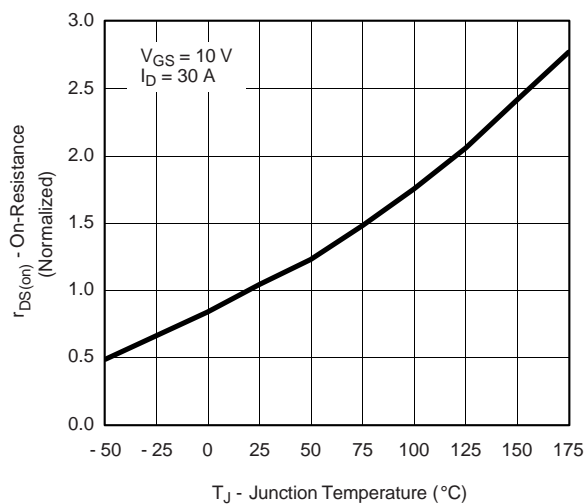
**On-Resistance vs. Drain Current**

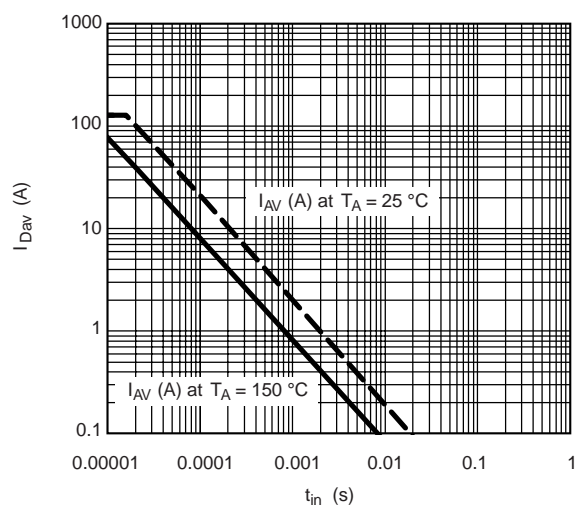
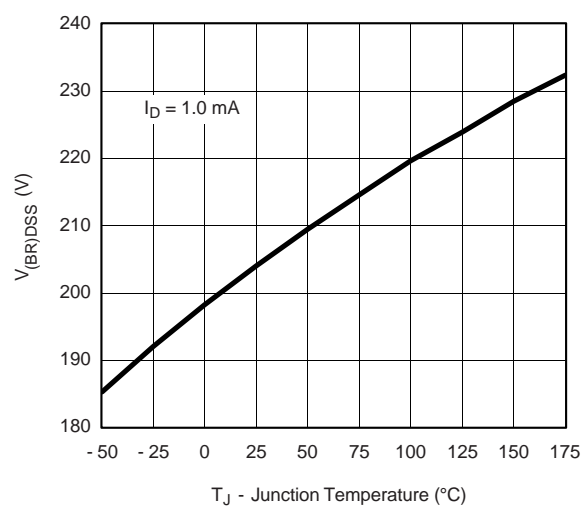


**Capacitance**



**Gate Charge**

**TYPICAL CHARACTERISTICS** 25 °C, unless otherwise noted

**On-Resistance vs. Junction Temperature**

**Source-Drain Diode Forward Voltage**

**Avalanche Current vs. Time**

**Drain Source Breakdown vs. Junction Temperature**

The graph shows the relationship between Drain Current ( $I_D$ ) and Ambient Temperature ( $T_C$ ) for the 2N3866 JFET. The current is constant at approximately 65 mA for temperatures up to 25°C. Beyond 25°C, the current decreases as temperature increases, reaching 0 mA at 175°C.

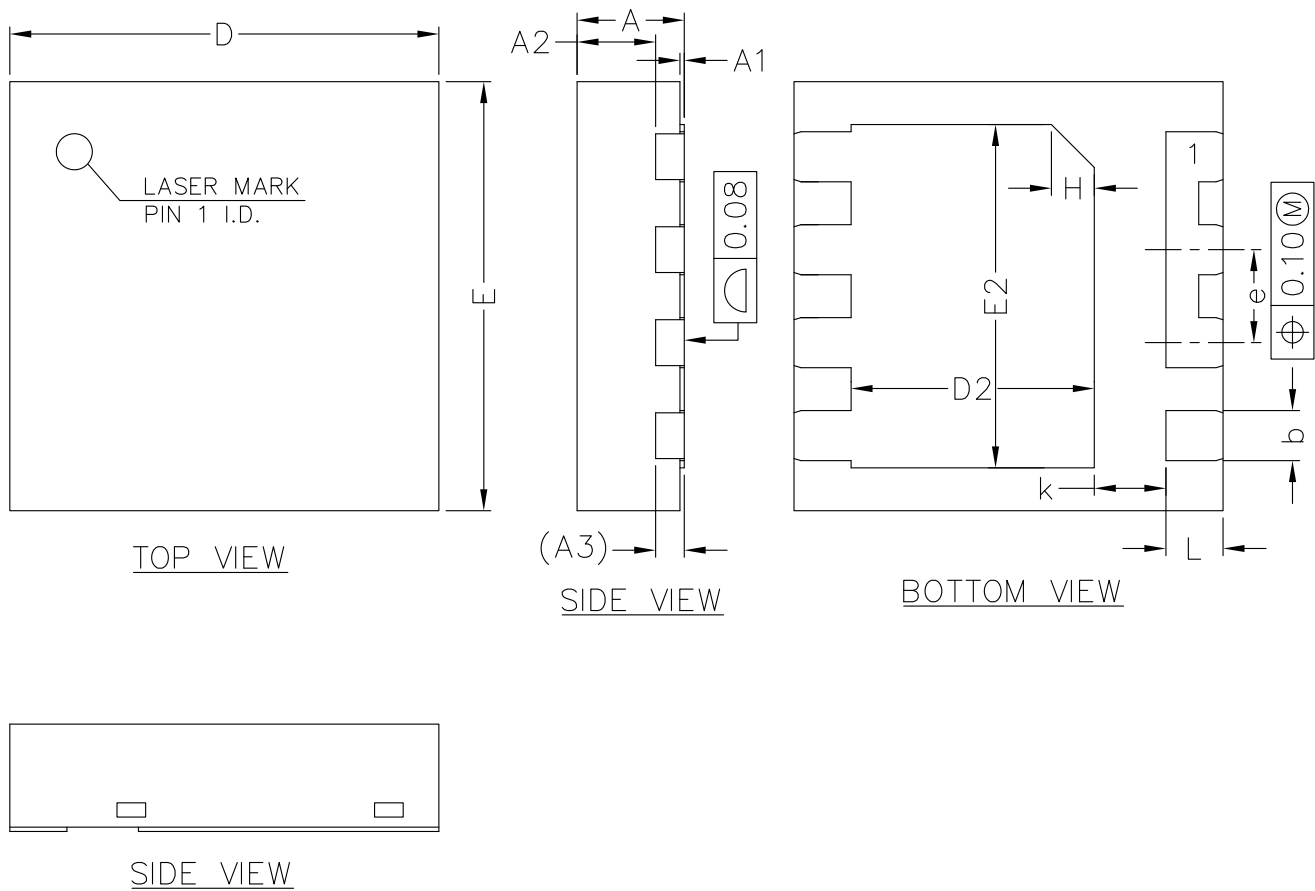
$T_C$ - Ambient Temperature ( $^{\circ}\text{C}$ )	$I_D$ - Drain Current (A)
0	65
25	65
50	60
75	55
100	45
125	35
150	25
175	0

Figure 10 is a graph showing Drain Current ( $I_D$ ) in Amperes (A) versus Drain-to-Source Voltage ( $V_{DS}$ ) in Volts (V). The y-axis is logarithmic, ranging from 0.1 to 1000 A. The x-axis is logarithmic, ranging from 0.1 to 1000 V. The graph shows the relationship between  $I_D$  and  $V_{DS}$  for various pulse widths: 10  $\mu$ s, 100  $\mu$ s, 1 ms, 10 ms, 100 ms, and DC. The DC curve is a solid line, and the pulse curves are dashed lines. The region where the current is limited by  $r_{DS(on)}$  is marked with an arrow and the text " $r_{DS(on)}$  Limited\*". The graph is for  $T_C = 25^\circ\text{C}$  and Single Pulse.

\*  $V_{GS} >$  minimum  $V_{GS}$  at which  $r_{DS(on)}$  is specified

Figure 10 is a log-log plot showing the Normalized Effective Transient Thermal Impedance (Y-axis, ranging from 0.01 to 2) versus Square Wave Pulse Duration (s) (X-axis, ranging from  $10^{-4}$  to 1). The plot includes curves for various duty cycles: 0.5, 0.2, 0.1, 0.05, 0.02, and a Single Pulse. The curves show that the normalized impedance increases with pulse duration and approaches a value of 1.0 for longer durations. The duty cycle of 0.5 shows the highest impedance for short pulse durations, while the single pulse curve shows the lowest impedance for short pulse durations.

### Normalized Thermal Transient Impedance, Junction-to-Case



COMMON DIMENSIONS  
(UNITS OF MEASURE=MILLIMETER)

SYMBOL	MIN	NOM	MAX
A	0.70	0.75	0.80
A1	0.00	0.02	0.05
A2	0.50	0.55	0.60
A3	0.20REF		
b	0.30	0.35	0.40
D	2.90	3.00	3.10
E	2.90	3.00	3.10
D2	1.60	1.70	1.80
E2	2.30	2.40	2.50
e	0.55	0.65	0.75
K	0.40	0.50	0.60
L	0.35	0.40	0.45

# Disclaimer

All products due to improve reliability, function or design or for other reasons, product specifications and data are subject to change without notice.

Taiwan VBsemi Electronics Co., Ltd., branches, agents, employees, and all persons acting on its or their representatives (collectively, the "Taiwan VBsemi"), assumes no responsibility for any errors, inaccuracies or incomplete data contained in the table or any other any disclosure of any information related to the product.(www.VBsemi.com)

Taiwan VBsemi makes no guarantee, representation or warranty on the product for any particular purpose of any goods or continuous production. To the maximum extent permitted by applicable law on Taiwan VBsemi relinquished: (1) any application and all liability arising out of or use of any products; (2) any and all liability, including but not limited to special, consequential damages or incidental ; (3) any and all implied warranties, including a particular purpose, non-infringement and merchantability guarantee.

Statement on certain types of applications are based on knowledge of the product is often used in a typical application of the general product VBsemi Taiwan demand that the Taiwan VBsemi of. Statement on whether the product is suitable for a particular application is non-binding. It is the customer's responsibility to verify specific product features in the products described in the specification is appropriate for use in a particular application. Parameter data sheets and technical specifications can be provided may vary depending on the application and performance over time. All operating parameters, including typical parameters must be made by customer's technical experts validated for each customer application. Product specifications do not expand or modify Taiwan VBsemi purchasing terms and conditions, including but not limited to warranty herein.

Unless expressly stated in writing, Taiwan VBsemi products are not intended for use in medical, life saving, or life sustaining applications or any other application. Wherein VBsemi product failure could lead to personal injury or death, use or sale of products used in Taiwan VBsemi such applications using client did not express their own risk. Contact your authorized Taiwan VBsemi people who are related to product design applications and other terms and conditions in writing.

The information provided in this document and the company's products without a license, express or implied, by estoppel or otherwise, to any intellectual property rights granted to the VBsemi act or document. Product names and trademarks referred to herein are trademarks of their respective representatives will be all.

## Material Category Policy

**Taiwan VBsemi Electronics Co., Ltd., hereby certify that all of the products are determined to be RoHS compliant and meets the definition of restrictions under Directive of the European Parliament 2011/65 / EU, 2011 Nian. 6. 8 Ri Yue restrict the use of certain hazardous substances in electrical and electronic equipment (EEE) - modification, unless otherwise specified as inconsistent.(www.VBsemi.com)**

**Please note that some documents may still refer to Taiwan VBsemi RoHS Directive 2002/95 / EC. We confirm that all products identified as consistent with the Directive 2002/95 / EC European Directive 2011/65 /.**

**Taiwan VBsemi Electronics Co., Ltd. hereby certify that all of its products comply identified as halogen-free halogen-free standards required by the JEDEC JS709A. Please note that some Taiwanese VBsemi documents still refer to the definition of IEC 61249-2-21, and we are sure that all products conform to confirm compliance with IEC 61249-2-21 standard level JS709A.**