

ALL Switch GaN Power Switch – Normally -ON V18G65A

Description

ALL-Switch is a GaN transistor based switch. ALL-Switch V18G65A provides a patented, high-density, lateral-layout GaN power transistor and advanced package with extremely low $R_{DS(ON)}$, exceptionally fast switching performance and a conveniently small footprint. It is very effective in applications requiring fast fuse with few ns reaction time.

Key features

- Ultra-fast
- Normally-On
- High power density
- Fully isolated package (2.5KV)

Applications

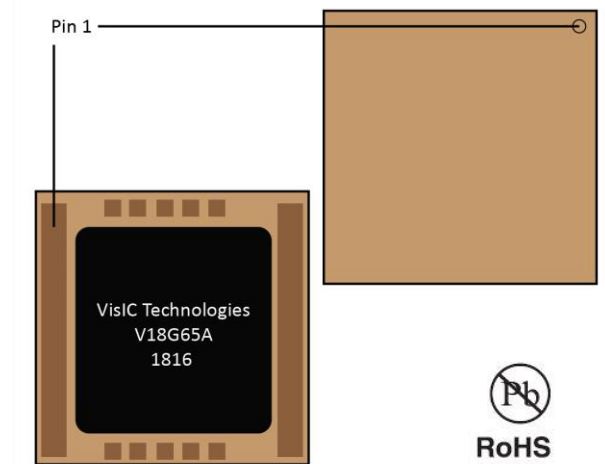
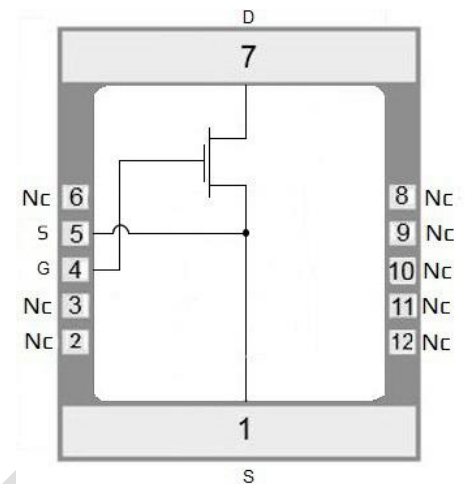
- Solar Inverters
- AC-DC Power Supply
- AC motors
- Battery chargers
- Automotive
- DC BUS fuse

Key Performance Parameters

Parameter	Value
VDS (V)	650
$R_{DS(ON)}$ (m Ω)	18
Qg (nC)	15
$I_{D,pulse}$ (A)	180
I_D (A)	50

Package Outline

Pin	Function	Pin	Function
1	Source	7	Drain
2	NC	8	NC
3	NC	9	NC
4	Gate	10	NC
5	Source	11	NC
6	NC	12	NC



ALL Switch GaN Power Switch – Normally -ON V18G65A

Maximum ratings ($T_j = 25^\circ\text{C}$ unless otherwise specified)						
Parameter	Symbol	Values			Unit	Conditions
		Min	Typical	Max		
Continuous drain current	I_D	-	-	53 42	A	$T_C = 25^\circ\text{C}$ $T_C = 100^\circ\text{C}$
Pulsed drain current	$I_{D,pulse}$	-	-	180	A	
Gate source voltage	V_{GS}	-20	-	0	V	static
Power dissipation	P_{TOT}	-	-	278	W	
Operating and storage temperature	T_j, T_{stg}	-55	-	+ 150	°C	
	T_C	-	-	+130		
Continuous reverse current	I_s	-	-	50	A	
Reverse pulse current ¹⁾	$I_{s,pulse}$	-	-	140	A	
Thermal characteristics						
Parameter	Symbol	Values			Unit	Conditions
		Min	Typical	Max		
Thermal resistance, junction-case	$R_{\theta JC}$	-	-	0.45	°C/W	
Thermal resistance, junction - ambient	$R_{\theta JA}$	-	-	65	°C/W	
Soldering peak temperature	T_{sold}	-	-	260	°C	from case for 10s

1) Duty cycle =10% limited by T_j

ALL Switch GaN Power Switch – Normally -ON V18G65A



Electrical characteristics ($T_j = 25^\circ\text{C}$ unless otherwise specified)

Parameter	Symbol	Values			Unit	Conditions
		Min	Typical	Max		
Static						
Drain-source breakdown voltage	V_{DS}	650	680	-	V	$V_{GS} = -15\text{V}$
Gate threshold voltage ¹⁾	$V_{(GS)th}$	-	-6.5	-	V	$V_{DCS} = -V_{GS}$ $I_D = 1\text{mA}$
Drain source leakage current ¹⁾	I_{DSS}	-	0.5	2	μA	$V_{GS} = -15\text{V}$ $V_{DS} = 650\text{V}$ $T_j = 25^\circ\text{C}$
		-	20	50		$V_{GS} = -15\text{V}$ $V_{DS} = 650\text{V}$ $T_j = 150^\circ\text{C}$
Gate-source leakage current	I_{GSS}	-	3	5	nA	$V_{DS} = 0\text{V}$ $V_{GS} = -20\text{V}$
Gate resistance	R_G	-	0.7	-	Ω	$f = 1\text{MHz}$
Drain-source on state resistance	$R_{DS(ON)}$	-	18	20	m Ω	$V_{GS} = 0\text{V}$ $I_D = 35\text{A}$ $T_j = 25^\circ\text{C}$
		-	34	38		$V_{GS} = 0\text{V}$ $I_D = 35\text{A}$ $T_j = 150^\circ\text{C}$
Reverse voltage drop- GaN non conductive	V_R	-	-	2.40	V	$I_D = 10\text{A}$ $T_j = 25^\circ\text{C}$
		-	-	2.65		$I_D = 10\text{A}$ $T_j = 150^\circ\text{C}$
Reverse voltage drop- GaN conductive	V_R	-	-	0.2	V	$I_D = 10\text{A}$ $T_j = 25^\circ\text{C}$
		-	-	0.4		$I_D = 10\text{A}$ $T_j = 150^\circ\text{C}$
Reverse recovery time	t_{rr}	-	-	0	nS	
Reverse recovery charge	Q_{rr}	-	-	0	nC	
Output Charge	Q_{oss}	-	-	120	nC	$V_{GS} = -15\text{V}$ $V_{DS} = 400\text{V}$
Dynamic						
Input capacitance	C_{iss}	-	760	800	pF	$f = 1\text{MHz}$ $V_{GS} = -15\text{V}$ $V_{DS} = 400\text{V}$
Output capacitance	C_{oss}	-	200	240		
Reverse transfer capacitance	C_{rss}	-	1.3	2.6		
Effective Output Capacitance, Energy Related	$C_{O(ER)}$	-	-	427	pF	$V_{GS} = -15\text{V}$ $V_{DS} = 0$ to 400V
Turn-on delay time	$t_{d(on)}$	-	7.5	-	ns	$V_{DS} = 400\text{V}$ $V_{GS} = -15\text{V}$ $R_G = 2\ \Omega$ $I_D = 35\text{A}$
Fall time	t_f	-	4.5	-		
Turn-off delay time	$t_{d(off)}$	-	36	-		
Rise time	t_r	-	2	-		

1) After applying Activation signal

ALL Switch GaN Power Switch – Normally -ON V18G65A



Electrical characteristics ($T_c = 25^\circ\text{C}$ unless otherwise specified)

Parameter	Symbol	Values			Unit	Conditions
		Min	Typical	Max		
Gate charge characteristics						
Gate to source charge	Q_{GS}	-	3.2		nC	$V_{GS}^{1)}$ =0V to 10V V_{DS} =400V I_D =30A pulsed
Gate to drain charge	Q_{GD}	-	10			
Total gate charge	Q_G	-	15			
Gate plateau voltage ¹⁾	$V_{plateau}$	6	-	6.8	V	
Case to drain Capacitance						
Capacitance	C_C	-	20	-	pF	@ 1 MHz 1V RMS

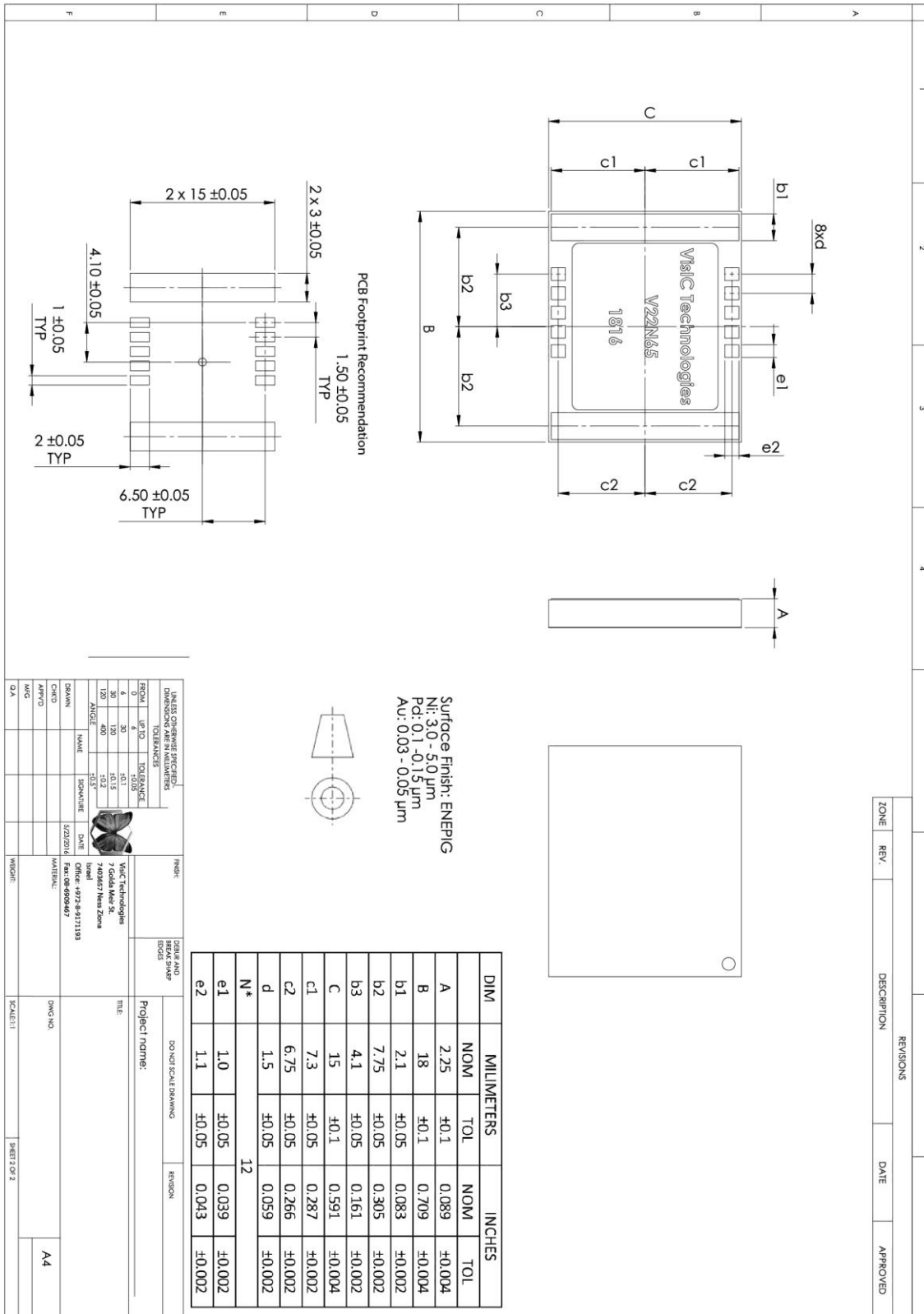
1) V_{GS} is relative to -15V

PRELIMINARY

ALL Switch GaN Power Switch - Normally -ON V18G65A



Package Outlines



Electrical characteristics diagrams

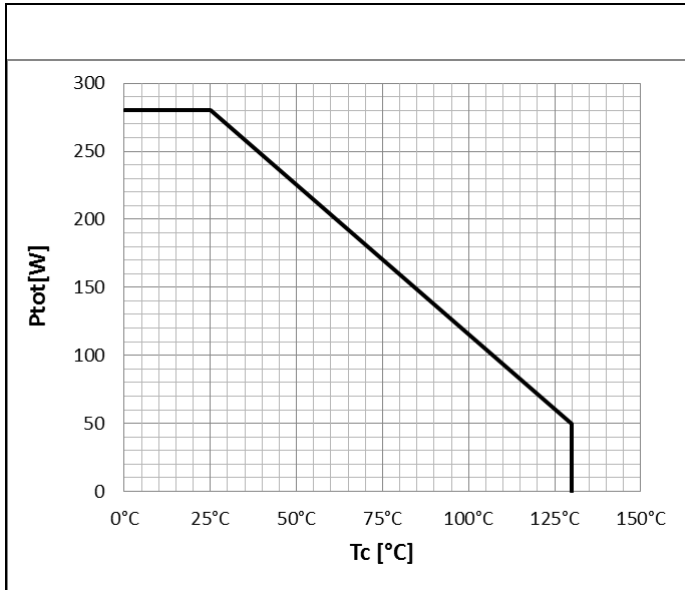


Figure 1: Power dissipation

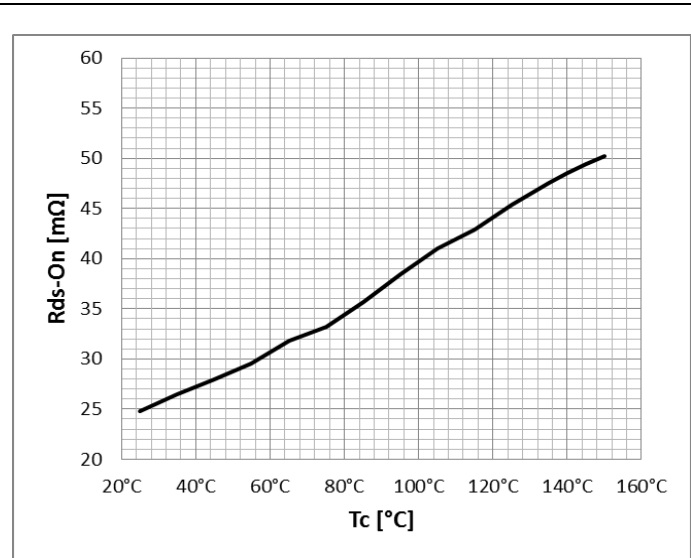


Figure 2: Drain-source on-state resistance

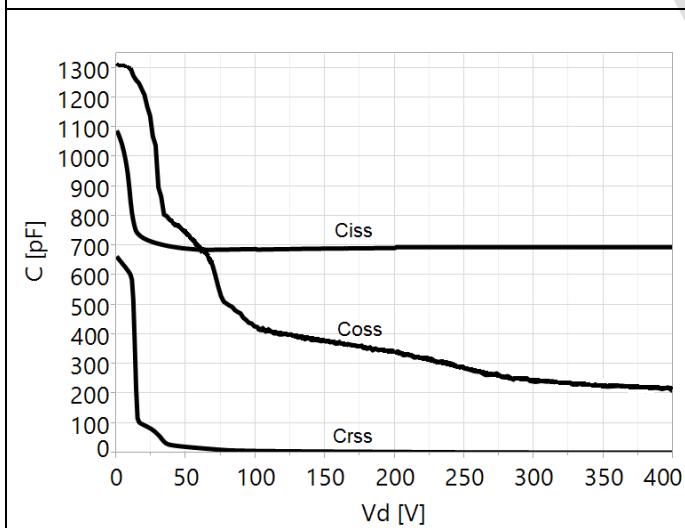


Figure 3: Typical capacitances

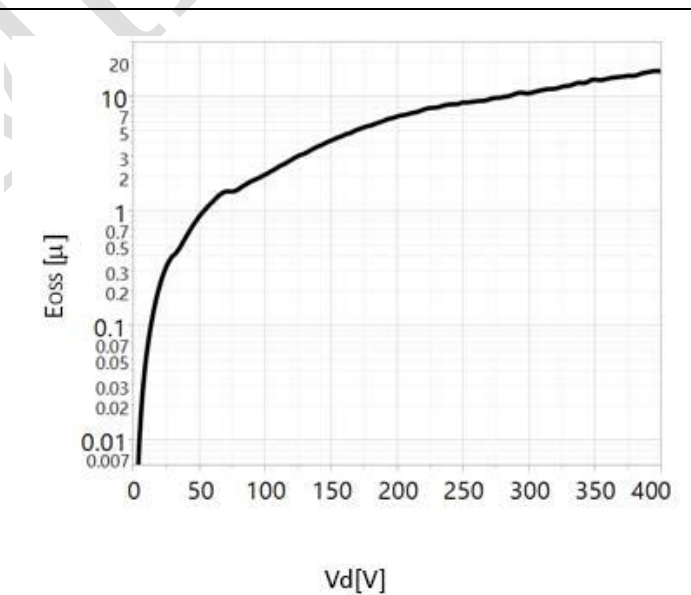
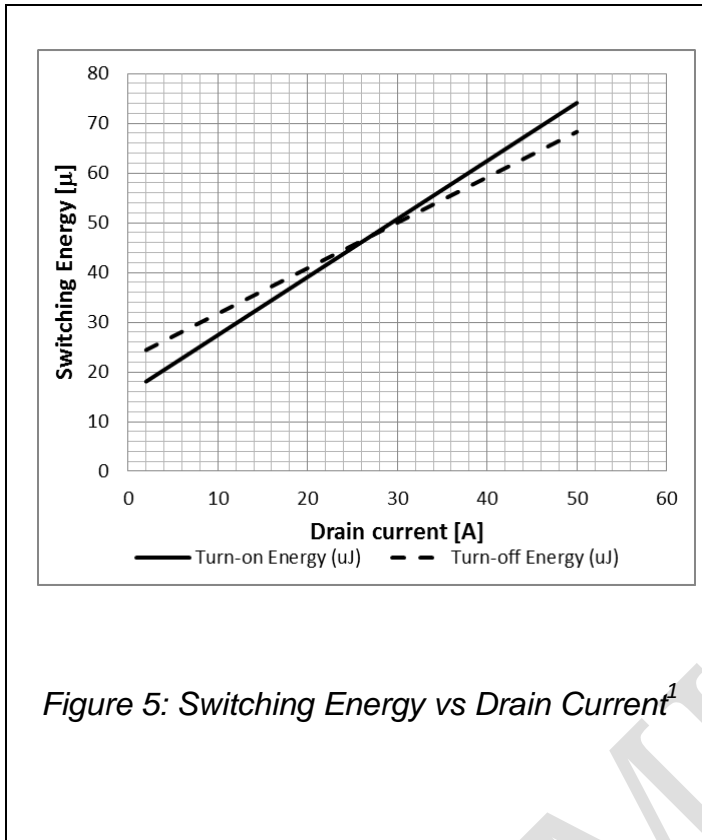
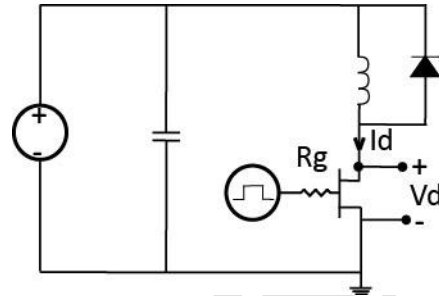


Figure 4: Typical Coss stored energy



1)

Circuit Used to Determine Switching Energy



Important Notice – VisIC Technologies reserve the right to make corrections, enhancements, improvements and other changes to its semiconductor products, latest issue, and to discontinue any product. Buyers should obtain the latest relevant information before placing orders and should verify that such information is current and complete. Unless expressly approved in writing by an authorized representative of VisIC technologies, VisIC technologies components are not designed or tested for use in, and is not intended for use in applications in which failure of the product could lead to death, personal injury or property damage, including but not limited to equipment used in the operation of nuclear facilities, life-support machines, cardiac defibrillators or similar emergency medical equipment, aircraft navigation or communication or control systems, air traffic control systems, weapons systems, authorized or warranted for use in lifesaving, life sustaining, military, or space applications, nor in products or systems where failure or malfunction may result in personal injury, death, or property or environmental damage. The information given in this document shall not in any event be regarded as a guarantee of performance. VisIC Technologies hereby disclaims any or all warranties and liabilities of any kind, including but not limited to warranties of non-infringement of intellectual property rights. All other brand and product names are trademarks or registered trademarks of their respective owners. Information provided herein is intended as a guide only and is subject to change without notice. The information contained herein or any use of such information does not grant, explicitly, or implicitly, to any party any patent rights, licenses, or any other intellectual property rights. All rights reserved.