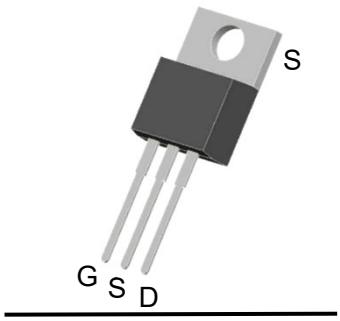
Prisemi®

PGCTO70R240B

700V GaN Power Transistor

Description

Product Summary		
V_{DS}(V)	$R_{DS(on)}$(mΩ)(Typ)	I_D(A)
700	240	10



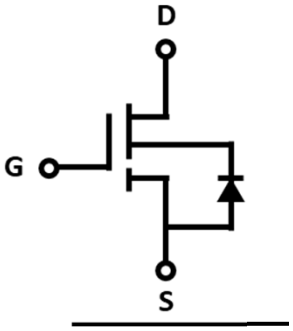
TO-220 (Top View)

Feature

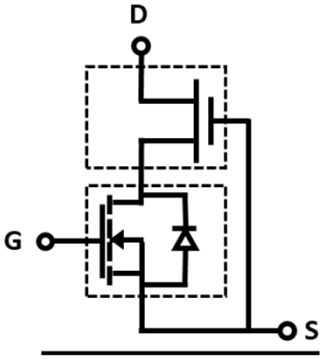
- Easy to use, compatible with standard gate drivers
- Excellent Q_G x $R_{DS(on)}$ figure of merit (FOM)
- Low Q_{RR}, no free-wheeling diode required
- Low switching loss
- RoHS compliant and Halogen-free

Applications

- High efficiency power supplies
- Telecom and datacom
- Automotive
- Servo motors



Schematic Symbol



Cascode
Device Structure

Absolute maximum rating@25℃

Parameter		Symbol	Rating	Unit
Drain-Source Voltage		V_{DS}	700	V
Gate-Source Voltage		V_{GS}	±20	V
Transient Drain-Source Voltage[1)]		V_{TDS}	800	V
Continuous Drain Current	T_C=25℃	I_D	10	A
	T_C=100℃		6.5	
Pulsed Drain Current (Pulse Width: 100μs)	T_C=25℃	I_{DM}	21	A
	T_C=150℃		17	
Power Dissipation		P_D	45	W
Soldering Peak Temperature		T_{CSOLD}	260	℃
Operating Junction and Storage Temperature		T_J, T_{STG}	-55 to 150	℃

Thermal Resistance

Parameter	Symbol	Min	Typ	Max	Unit
Thermal Resistance, Junction-to-Case	$R_{θJC}$	-	2.8	-	℃/W
Thermal Resistance, Junction-to-Ambient[2)]	$R_{θJA}$	-	50	-	℃/W

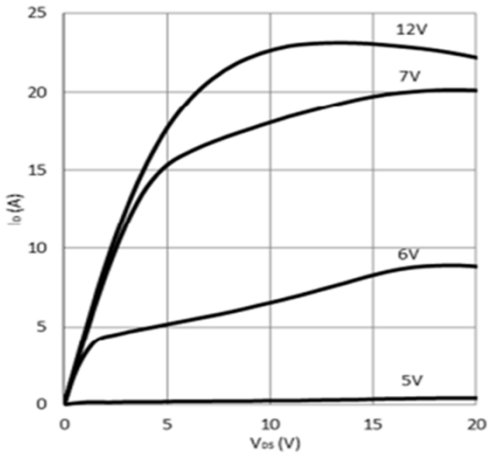
Electrical characteristics per line@25℃ (unless otherwise specified)

Parameter	Symbol	Conditions		Min.	Typ.	Max.	Units
Statistic Characteristics							
Maximum Drain-Source Voltage	V_{DS-Max}	V_{GS} = 0V		700	-	-	V
Drain-Source Breakdown Voltage	BV_{DSS}	V_{GS} = 0V,I_D = 250μA		-	1000	-	V
Zero Gate Voltage Drain Current	I_{DSS}	V_{DS}=700V, V_{GS}=0V	T_J=25℃	-	8	20	μA
			T_J=150℃	-	50	-	
Gate-Body Leakage Current	I_{GSS}	V_{GS} = ±20V,V_{DS} = 0V		-	-	±150	nA
Gate Threshold Voltage	$V_{GS(th)}$	V_{DS} = V_{GS},I_D = 500μA		3	4	5	V
Gate threshold voltage temperature coefficient	$\triangle V_{GS(th)}/T_J$			-	-13	-	mV/℃
Drain-Source On-State Resistance[3]	$R_{DS(ON)}$	V_{GS}=12V, I_D=4A	T_J=25℃	-	240	300	mΩ
			T_J=150℃	-	480	-	
Dynamic Characteristics							
Input Capacitance	C_{lss}	V_{DS} = 400V,V_{GS} = 0V, f = 1MHz		-	321	-	pF
Output Capacitance	C_{oss}			-	16	-	
Reverse Transfer Capacitance	C_{rss}			-	0.6	-	
Effective Output Capacitance, Energy Related	$C_{o(er)}$	V_{GS} = 0V, V_{DS} = 0-400V		-	26	-	pF
Effective Output Capacitance, Time Related	$C_{o(tr)}$			-	73	-	
Output Charge	Q_{oss}			-	29	-	nC
Turn-on Delay Time	$t_{d(on)}$	V_{DS} = 400V,I_D = 3A, V_{GS} =0-12V,R_G=47Ω		-	36	-	ns
Turn-on Rise Time	t_r			-	16	-	
Turn-Off Delay Time	$t_{d(off)}$			-	40	-	
Turn-Off Fall Time	t_f			-	8	-	
Total Gate Charge	Q_g	V_{DS} = 400V,I_D = 6A, V_{GS} =0-12V		-	6.1	-	nC
Gate-Source Charge	Q_{gs}			-	1.7	-	
Gate-Drain Charge	Q_{gd}			-	2.1	-	
Reverse Diode Characteristics							
Diode Forward Voltage	V_{SD}	V_{GS}=0V, I_S=3A		-	1.4	-	V
		V_{GS}=0V, I_S=6A	T_J=25℃	-	2.0	-	
			T_J=150℃	-	2.8	-	
Reverse Recovery Time	t_{rr}	V_{GS}=0V, I_S=6A, V_{DD}=400V, di/dt=1000A/μs		-	16	-	ns
Reverse Recovery Charge	Q_{rr}			-	2.9	-	μC

Notes:
1. Off-state spike duty cycle < 0.01, spike duration < 2μs
2. Device on one layer epoxy PCB for drain connection (vertical and without air stream cooling, with 6cm²copper area and 70μm thickness)
3. Dynamic on-resistance; see Figure 19 and 20 for test circuit and configurations

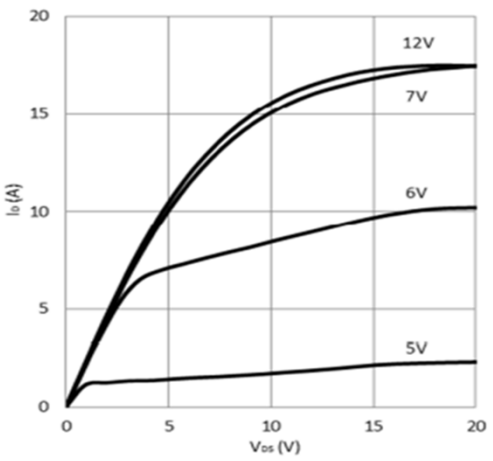
Typical Characteristics

Figure 1. Typical Output Characteristics T_J=25℃



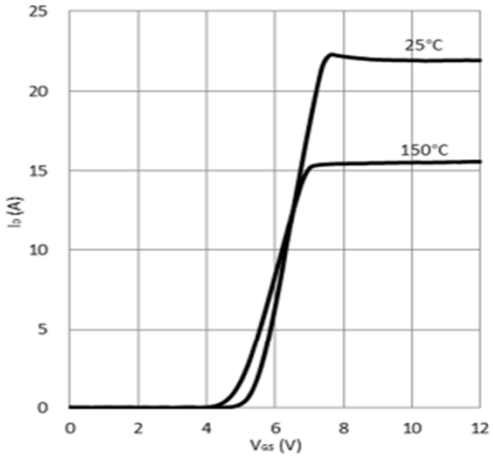
Parameter: V_{GS}

Figure 2. Typical Output Characteristics T_J=150℃



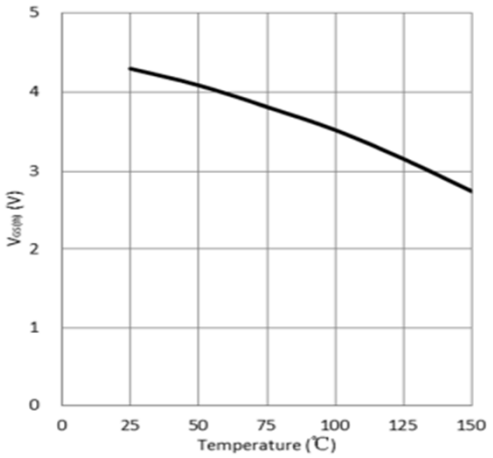
Parameter: V_{GS}

Figure 3. Typical Transfer Characteristics



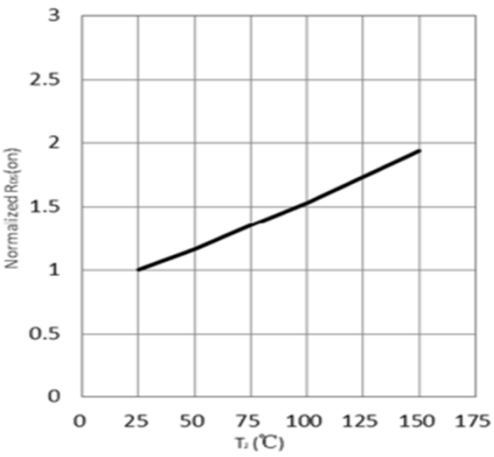
V_{DS}=10V, Parameter: T_J

Figure 4. $V_{GS(th)}$ Vs Temperature Characteristics



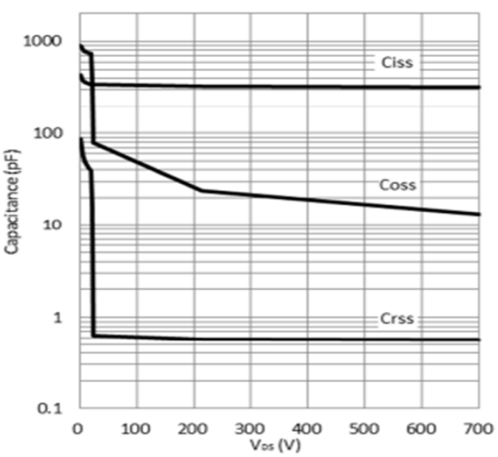
I_D=500uA

Figure 5. Normalized On-resistance



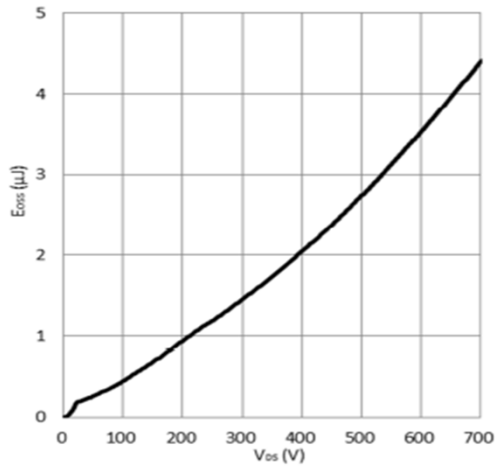
I_D=4A, V_{GS}=12V

Figure 6. Typical Capacitance



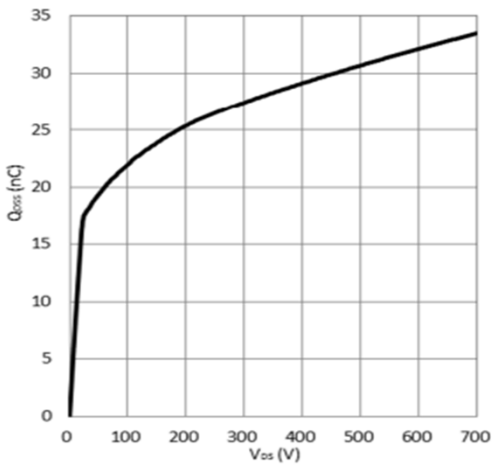
V_{GS}=0V, f=1MHz

Figure 7. Typical Coss Stored Energy



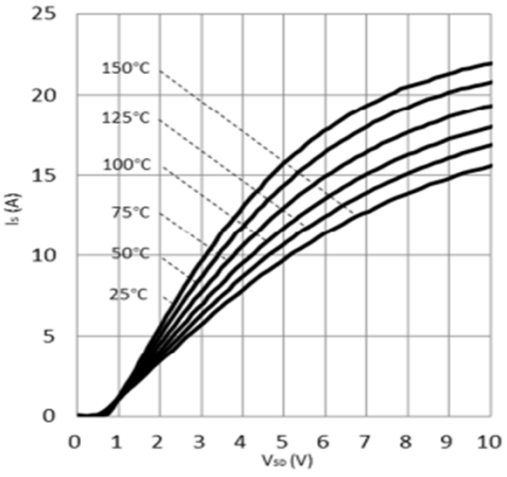
V_{GS}=0V, f=1MHz

Figure 8. Typical Qoss



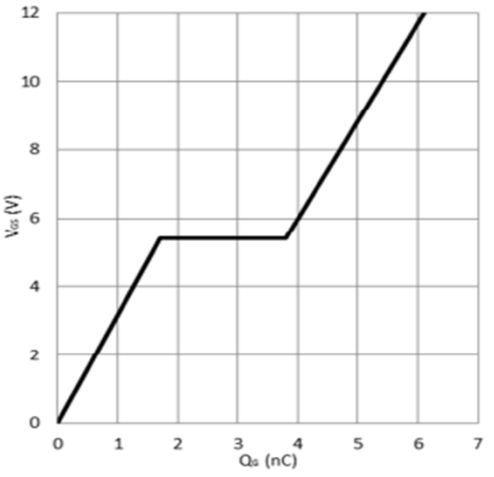
V_{GS}=0V, f=1MHz

Figure 9. Forward Characteristic of Rev. Diode



$I_S=f(V_{SD})$, Parameter T_J

Figure 10. Typical Gate Charge



I_{DS}=6A, V_{DS}=400V

Figure 11. Power Dissipation

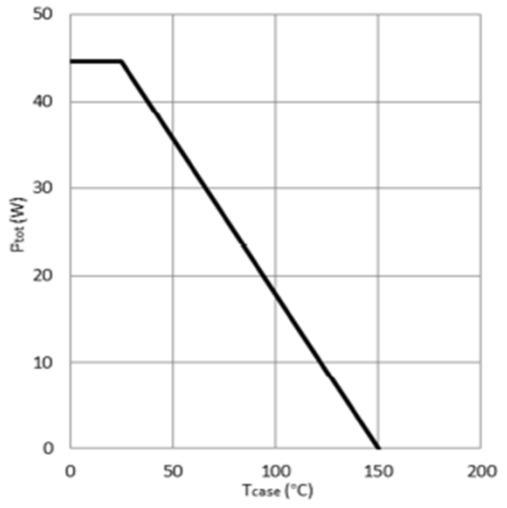


Figure 12. Current Derating

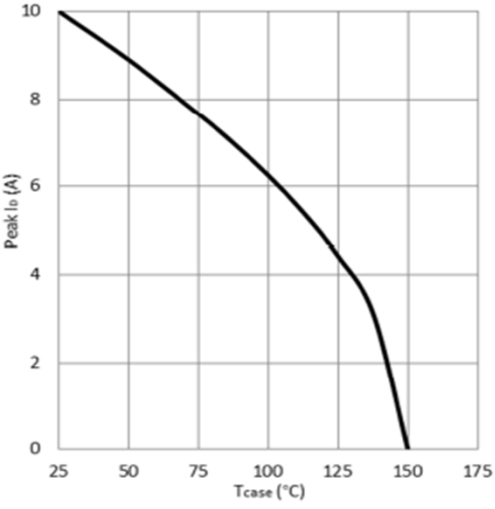


Figure 13. Transient Thermal Resistance

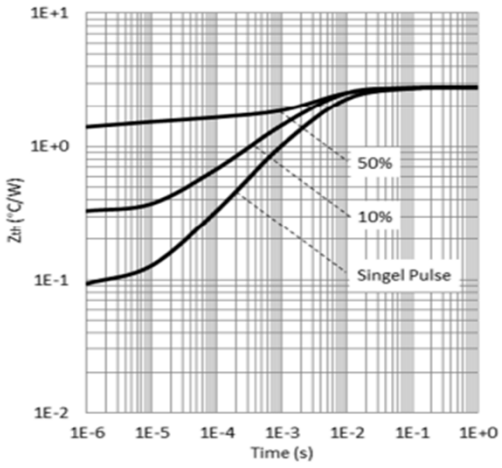
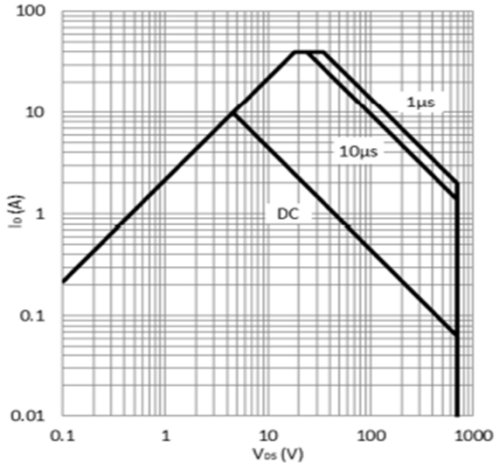
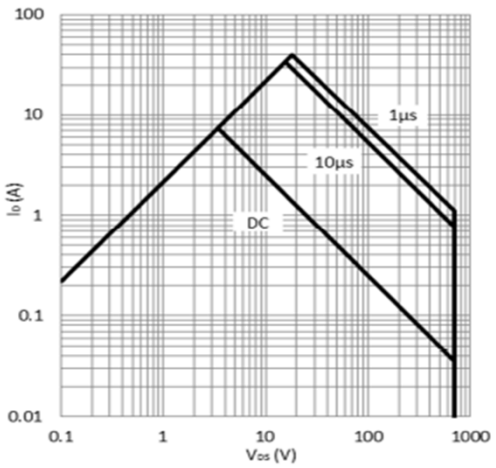


Figure 14. Safe Operating Area T_C=25℃



calculated based on thermal limit

Figure 15. Safe Operating Area T_C=80℃



calculated based on thermal limit

Test Circuits and Waveforms

Figure 15. Switching Time Test Circuit

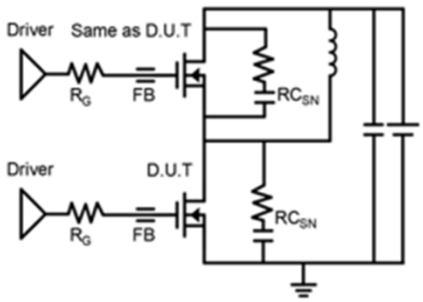


Figure 16. Switching Time Waveform

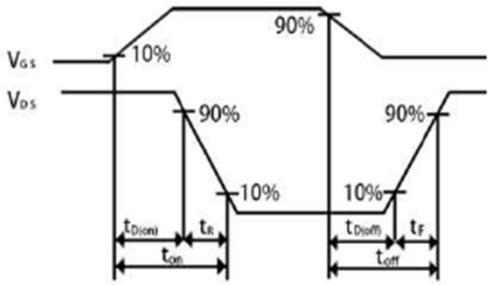


Figure 17. Dynamic $R_{DS(on)}$ Test Circuit

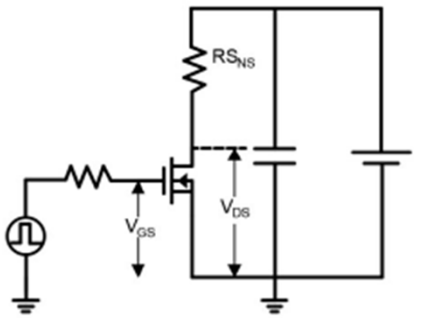


Figure 18. Dynamic $R_{DS(on)}$ Waveform

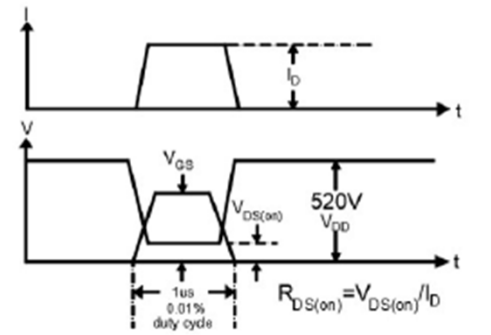


Figure 19. Diode Characteristic Test Circuits

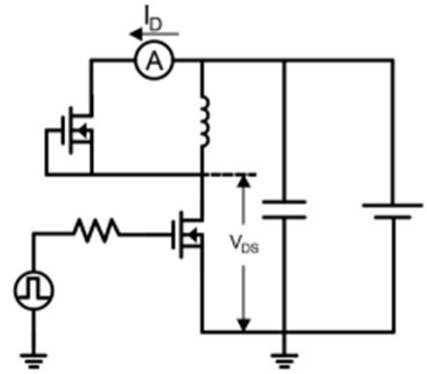
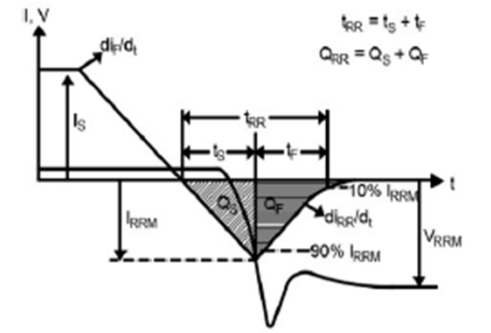
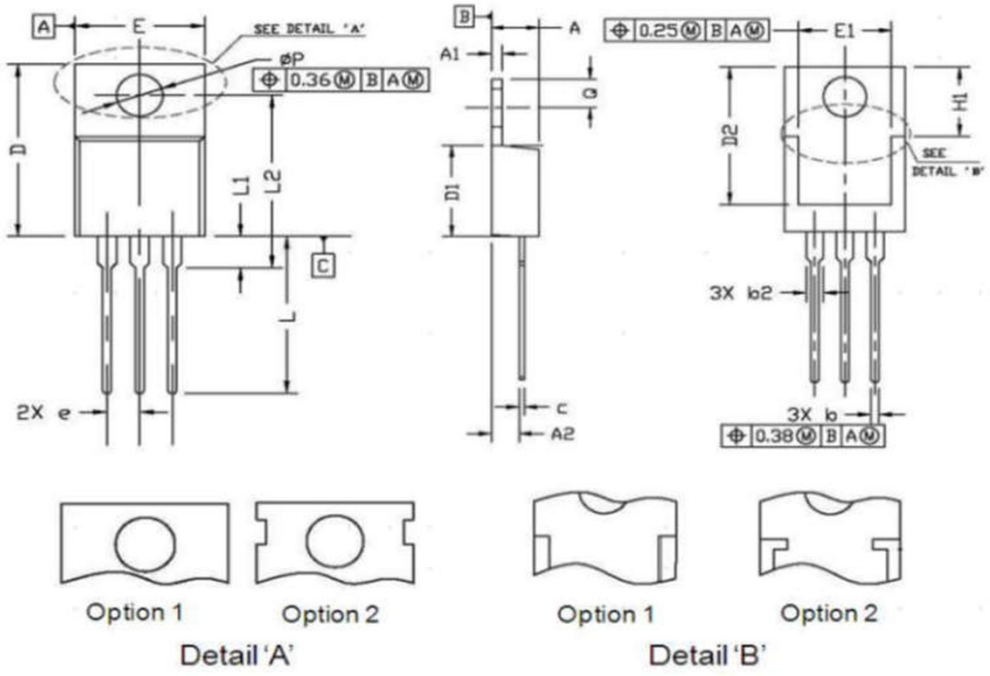


Figure 20. Diode Recovery Waveform



Product Dimension (TO-220)



SYMBOL	Millimeter	
	Min	Max
A	4.30	4.80
A1	1.20	1.45
A2	2.20	2.90
b	0.69	0.95
b2	1.00	1.60
c	0.33	0.65
D	14.70	16.20
D1	8.59	9.65
D2	11.75	13.60
e	2.54BSC	
E	9.60	10.60
E1	7.00	8.46
H1	6.20	7.00
L	12.60	14.80
L1	2.70	3.80
L2	12.13	16.50
Q	2.40	3.10
P	3.50	3.90

IMPORTANT NOTICE

Prisemi® and Prisemi® are registered trademarks of **Prisemi Electronics Co., Ltd** (Prisemi**),** Prisemi reserves the right to make changes without further notice to any products herein. Prisemi makes no warranty, representation or guarantee regarding the suitability of its products for any particular purpose, nor does Prisemi assume any liability arising out of the application or use of any product or circuit, and specifically disclaims any and all liability, including without limitation special, consequential or incidental damages. “Typical” parameters which may be provided in Prisemi data sheets and/or specifications can and do vary in different applications and actual performance may vary over time. All operating parameters, including “Typicals” must be validated for each customer application by customer’s technical experts. Prisemi does not convey any license under its patent rights nor the rights of others. The products listed in this document are designed to be used with ordinary electronic equipment or devices, Should you intend to use these products with equipment or devices which require an extremely high level of reliability and the malfunction of with would directly endanger human life (such as medical instruments, aerospace machinery, nuclear-reactor controllers, fuel controllers and other safety devices), please be sure to consult with our sales representative in advance.

Website: http://www.prisemi.com
For additional information, please contact your local Sales Representative.