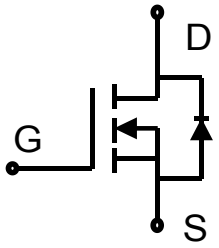
WLU380R650GM

N-Channel 650V 11A 0.38Ω Power MOSFET

Description

WENLAI Power MOSFET is fabricated using **advanced super junction** technology. The resulting device has extremely low on resistance, making it especially suitable for applications which require superior power density and outstanding efficiency.

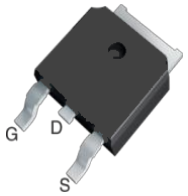


N-Channel MOSFET

Features

- Ultra low $R_{DS(on)}$
- Ultra low gate charge (typ. Q_g = 19.9nC)
- 100% UIS tested
- RoHS compliant

Pin Configuration



TO-252

Applications

- Power factor correction (PFC).
- Switched mode power supplies (SMPS).
- Uninterruptible power supply (UPS).

Product Summary

V_{DS} @ $T_{j,max}$	700V
$R_{DS(on),max}$	0.38Ω
I_{DM}	33A
$Q_{g,typ}$	19.9 nC

Absolute Maximum Ratings

Parameter	Symbol	Value	Unit
Drain-Source Voltage	V_{DSS}	650	V
Continuous drain current (T_C = 25°C)	I_D	11	A
(T_C = 100°C)		7	A
Pulsed drain current [1]	I_{DM}	33	A
Gate-Source voltage	V_{GSS}	±30	V
Avalanche energy, single pulse [2]	E_{AS}	218	mJ
Power Dissipation	P_D	113	W
Operating and Storage Temperature Range	T_J, T_{STG}	-55 to +150	°C
Continuous diode forward current	I_S	11	A
Diode pulse current	$I_{S,pulse}$	33	A

Thermal Characteristics

Thermal Resistance, Junction-to-Case	$R_{\theta JC}$	1.1	°C/W
Thermal Resistance, Junction-to-Ambient [3]	$R_{\theta JA}$	120	°C/W

Package Marking and Ordering Information

Device	Device Package	Marking	Units/Reel
WLU380R650GM	TO-252	WLU380R650GM	2500

Electrical Characteristics

T_c = 25°C unless otherwise noted

Parameter	Symbol	Test Condition	Min.	Typ.	Max.	Unit
Static characteristics						
Drain-source breakdown voltage	BV_{DSS}	V_{GS}=0 V, I_D=0.25 mA	650	-	-	V
Gate threshold voltage	$V_{GS(th)}$	V_{DS}=V_{GS}, I_D=0.25mA	2.5	3.0	4.5	V
Drain cut-off current	I_{DSS}	V_{DS}=650 V, V_{GS}=0 V,T_j = 25°C	-	-	1	μA
Gate leakage current, Forward	I_{GSSF}	V_{GS}=30 V, V_{DS}=0 V	-	-	100	nA
Gate leakage current, Reverse	I_{GSSR}	V_{GS}=-30 V, V_{DS}=0 V	-	-	-100	nA
Drain-source on-state resistance	$R_{DS(on)}$	V_{GS}=10 V, I_D=5.5 A T_j = 25°C T_j = 150°C	- - -	 0.32 0.8	 0.38 -	Ω
Gate resistance	R_G	f=1 MHz, open drain	-	13	-	Ω
Dynamic characteristics						
Input capacitance	C_{iss}	V_{DS} = 100 V, V_{GS} = 0 V,	-	740	-	pF
Output capacitance	C_{oss}	f = 250 kHz	-	32.7	-	
Reverse transfer capacitance	C_{rss}		-	0.91	-	
Turn-on delay time	$t_{d(on)}$	V_{DD} = 400V, I_D = 5.5A	-	20.4	-	ns
Rise time	t_r	R_G = 10Ω, V_{GS}=15V	-	31.2	-	
Turn-off delay time	$t_{d(off)}$		-	83.8	-	
Fall time	t_f		-	13.7	-	
Gate charge characteristics						
Gate to source charge	Q_{gs}	V_{DD}=520 V, I_D=5.5A,	-	3.6	-	nC
Gate to drain charge	Q_{gd}	V_{GS}=0 to 10 V	-	9.1	-	
Gate charge total	Q_g		-	19.9	-	
Gate plateau voltage	$V_{plateau}$		-	5	-	V
Reverse diode characteristics						
Diode forward voltage	V_{SD}	V_{GS}=0 V, I_F=5.5A	-	-	1.1	V
Reverse recovery time	t_{rr}	V_R=400 V, I_F=5.5A,	-	260	-	ns
Reverse recovery charge	Q_{rr}	dI_F/dt=100 A/μs	-	2.3	-	μC
Peak reverse recovery current	I_{rrm}		-	18	-	A

Notes:

1. Limited by maximum junction temperature, maximum duty cycle is 0.75.
2. I_{AS} = 3.3A, L=40mH,V_{DD} = 60V, Starting T_j= 25°C.
3. The value of R_{thJA} is measured by placing the device in a still air box which is one cubic foot.

Electrical Characteristics Diagrams

Figure 1. Typ. Output Characteristics

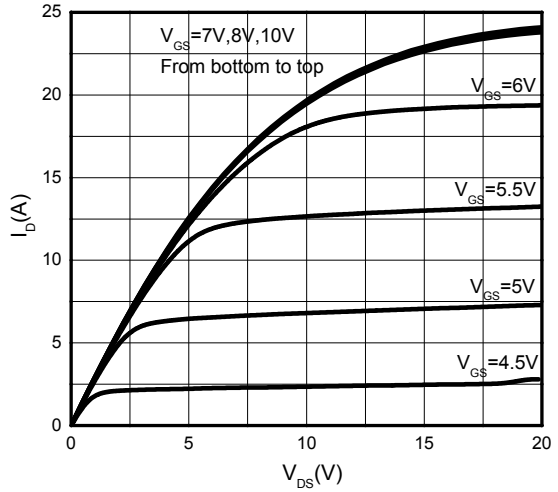


Figure 2. Transfer Characteristics

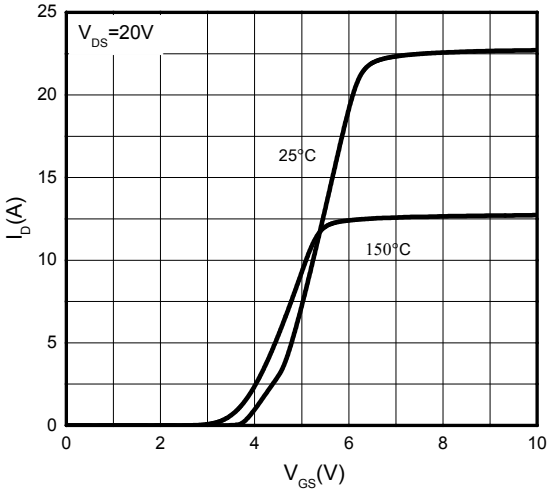


Figure 3. On-Resistance vs. Drain Current

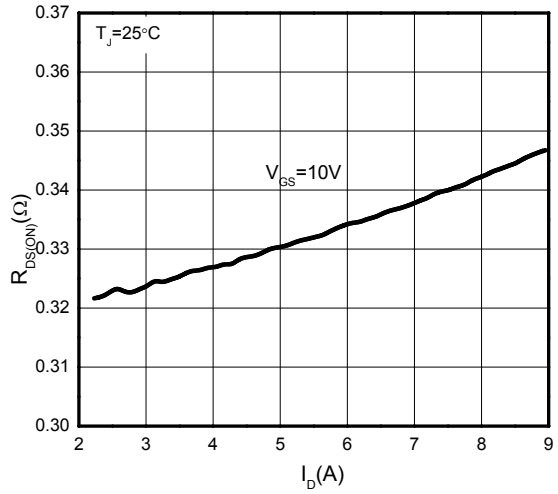


Figure 4.On-Resistance vs.Temperature

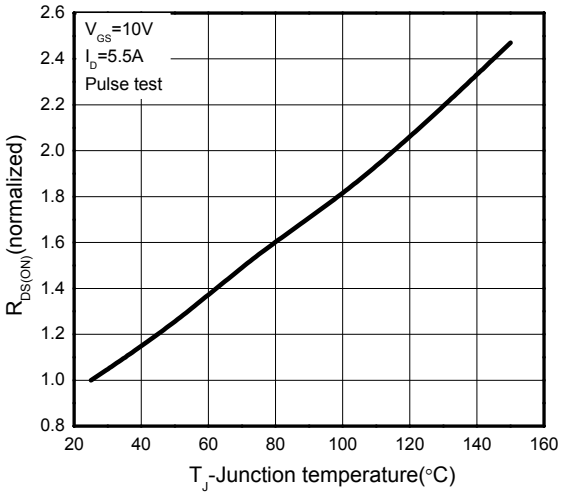


Figure 5.Breakdown Voltage vs.Temperature

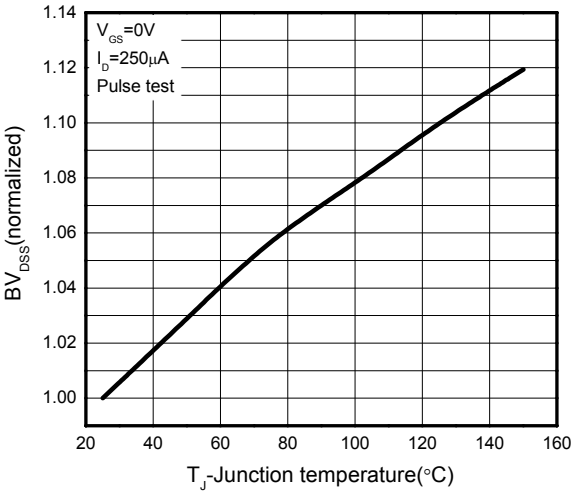


Figure 6.Threshold Voltage vs.Temperature

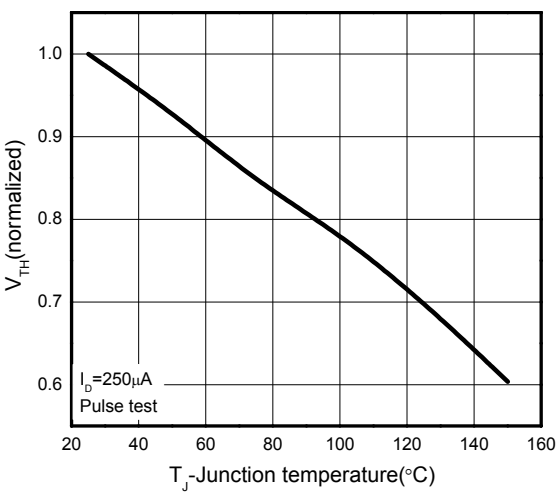


Figure 7.Body-Diode Characteristics

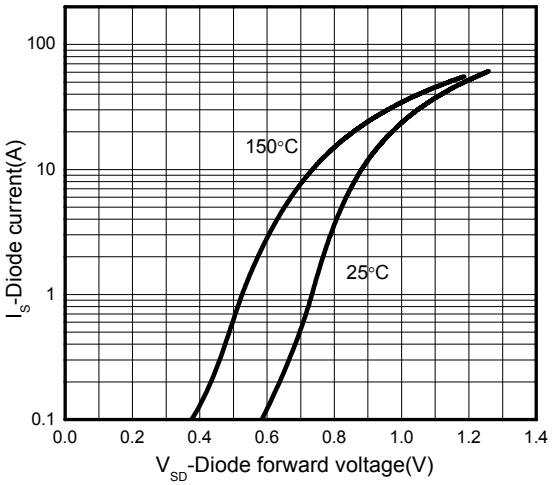


Figure 8.Capacitance Characteristics

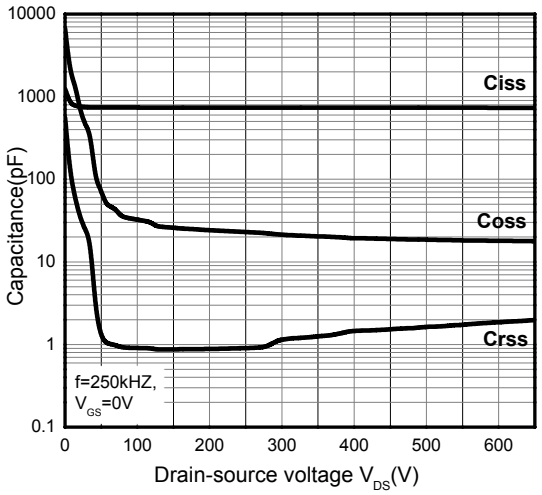


Figure 9.Gate Charge Characteristics

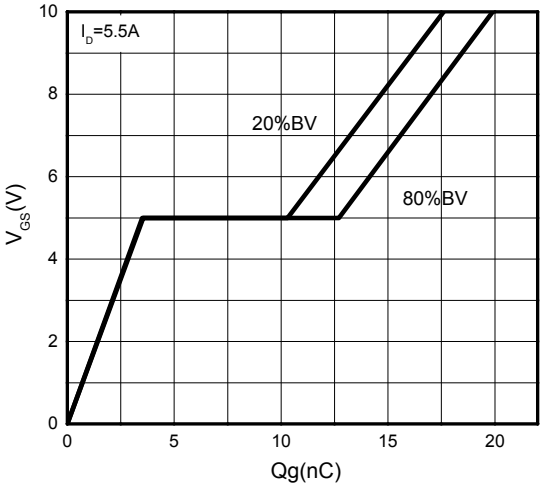


Figure 10.Drain Current Derating

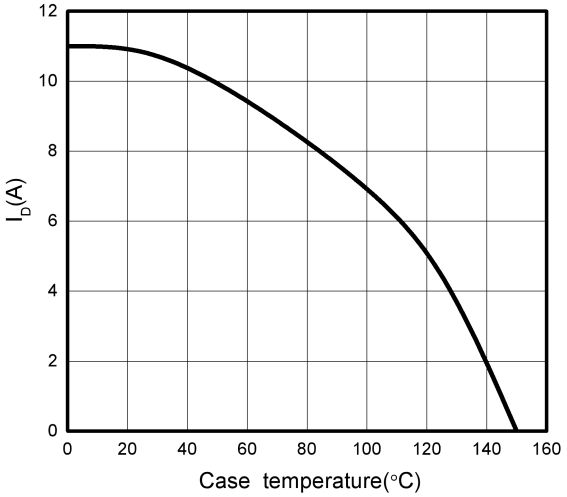


Figure 11.Power Dissipation vs.Temperature

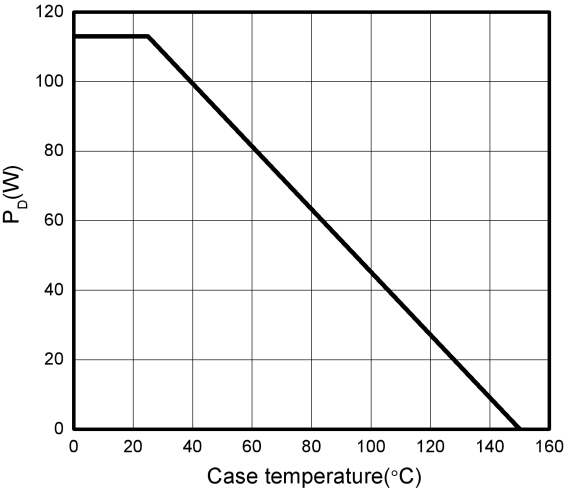


Figure 12: Safe Operating Area

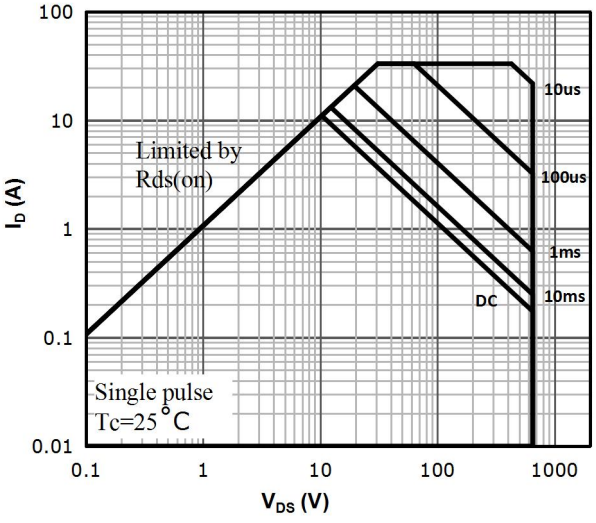
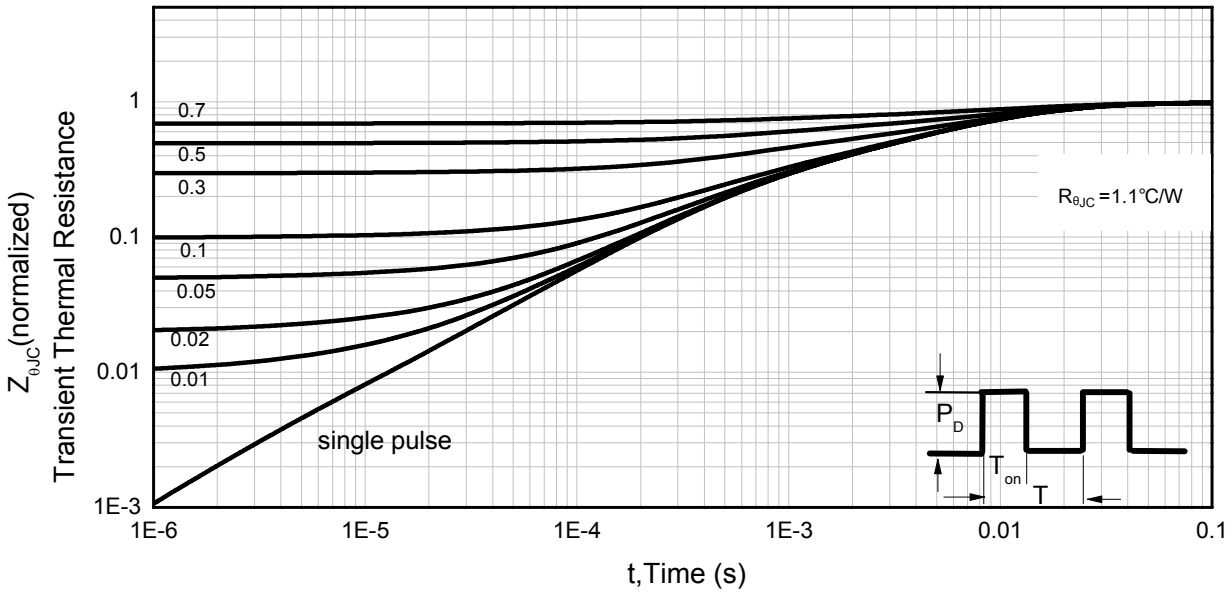
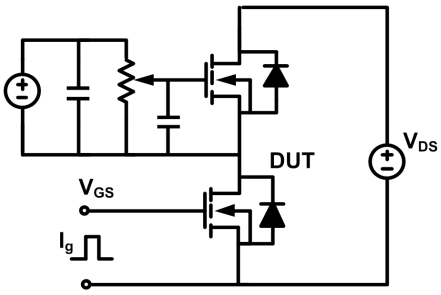


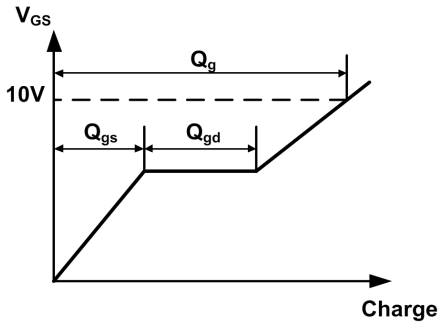
Figure 13. Normalized Maximum Transient Thermal Impedance (RthJC)



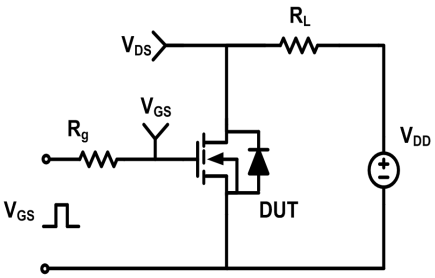
Test Circuit & Waveforms

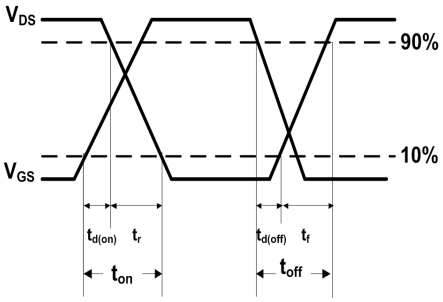
Gate Charge Test Circuit & Waveform



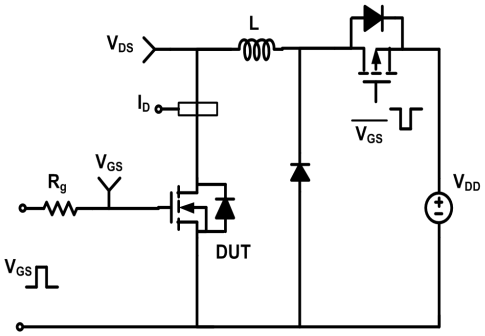


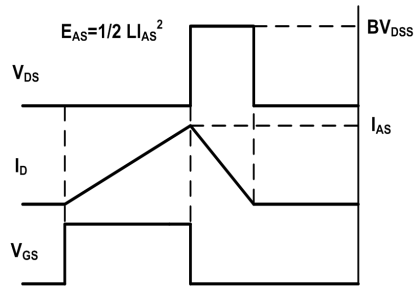
Resistive Switching Test Circuit & Waveform



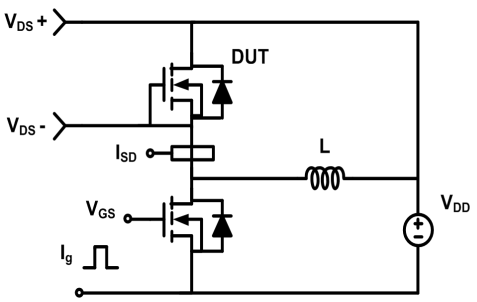


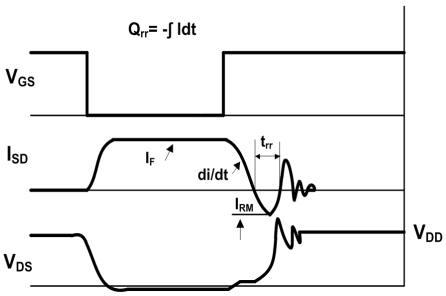
Unclamped Inductive Switching (UIS) Test Circuit & Waveform



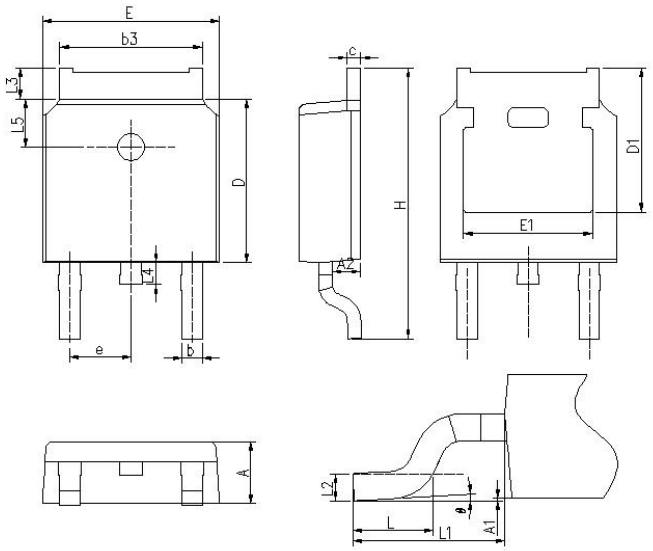


Diode Recovery Test Circuit & Waveform





Mechanical Dimensions for TO-252



DIMENSIONS IN MILLITMETERS		
SYMBOL	MIN	MAX
A	2.18	2.4
A1	-	0.2
A2	0.9	1.17
b	0.65	0.9
b3	4.95	5.5
c	0.43	0.89
D	5.97	6.22
D1	5.21	-
E	6.35	6.8
E1	4.32	-
e	2.286BSC	
H	9.4	10.5
L	0.38	1.78
L1	2.90BSC	
L2	0.51BSC	
L3	0.88	1.28
L4	-	1.02
L5	1.65	1.95
θ	0°	10°

Disclaimer

Brunei has made reasonable commercial efforts to ensure that the information given in this datasheet is correct. However, it must clearly be understood that such information is for guidance only and does not constitute any representation or form part of any offer or contract.

For documents and material available from this datasheet,Bruneidoes not warrant or assume any legal liability or responsibility for the accuracy, completeness, or usefulness of any information, product, technology or process disclosed hereunder.

Bruneireserves the rights to at its own discretion to make any changes or improvements to this datasheet. Unless said datasheet is incorporated into the formal contract, any customer should not rely on the information as any specification or product parameters duly committed by Brunei Customers are hereby advised to verify that the information contained herein is current and complete before the entering of any contract or acknowledgement of any purchase order. Accordingly, all products specified hereunder shall be sold subject to Brunėi s terms and conditions supplied at the time of order acknowledgement. Except where agreed upon by contractual agreement, testing of all parameters of each product is not necessarily performed.

Brunei does not warrant or convey any license either expressed or implied under its patent rights, nor the rights of others. Reproduction of information contained herein shall be only permissible if such reproduction is without any modification or alteration. Reproduction of this information with any alteration is an unfair and deceptive business practice. Brunei is not responsible or liable for such altered documentation.

Resale of Brunėi s products with statements different from or beyond the parameters stated by Brunei for that product or service voids all express or implied warrantees for the associated Brunėi s product or service and is unfair and deceptive business practice. Brunei is not responsible or liable for any such statements.

Brunėi s products are not authorized for use as critical components in life support devices or systems without the express written approval of Brunei. As used herein:

1. Life support devices or systems are devices or systems which, (a) are intended for surgical implant into the body, or (b) support or sustain life, and whose failure to perform, when properly used in accordance with instructions for use provided in the labeling, can be reasonably expected to result in a significant injury to the user.
2. A critical component is any component of a life support device or system whose failure to perform can be reasonably expected to cause the failure of the life support device or system, or to affect its safety or effectiveness.