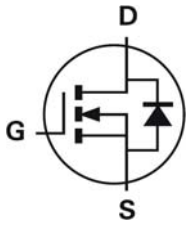
DG100N14Q

DG-FET™ 100V N-Channel Power MOSFET

Key Performance Parameters		
Parameter	**Value**	**Unit**
V_{DSS}	100	V
$R_{DS(ON)\ max.}$ V_{GS}=10V	17	mΩ
$R_{DS(ON)\ max.}$ V_{GS}=4.5V	23	mΩ
I_D	54	A
Q_g	21.23	nC
Q_{gd}	5.65	nC

PDFN 5x6-8L



Features	Application
• Optimized for synchronous rectification Low Input Capacitance • Low Miller Capacitance • Fully Characterized Capacitance and Avalanche • Pb-free lead plating; RoHS compliant	• BLDC Motor drive applications • Battery powered circuits • Synchronous rectifier applications • Resonant mode power supplies

Ordering Information

Ordering Code	RoHS Status	Package	Package Code	Packing	Quantity
DG100N14Q	Halogen-Free	PDFN 5x6-8L	Q	Tape & Reel	2,500

Absolute Maximum Ratings (T_J=25°C unless otherwise noted)

Parameter		Symbol	Value	Unit
Drain-Source Voltage		V_{DS}	100	V
Gate-Source Voltage		V_{GS}	±20	V
Drain Current-Continuous	T_C=25°C	I_D	54	A
	T_C=100°C		34	A
Drain Current-Pulsed Note 1	T_C=25°C	I_{DM}	100	A
Avalanche Current		I_{AS}	15	A
Single Pulse Avalanche Energy Note 3		E_{AS}	11	mJ
Maximum Power Dissipation	T_C=25°C	P_{tot}	78.1	W
Operating and Storage Temperature Range		T_J, T_{STG}	-55 to +150	°C

Thermal Resistance Ratings

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
Junction-to-Ambient Note 2	$R_{\theta JA}$	Steady State	-	-	55	°C/W
Thermal resistance, Junction-to-Case	$R_{\theta JC}$	Steady State	-	-	1.6	°C/W

Notes:

1. Pulse Test: Pulse Width ≤ 300μs, Duty Cycle ≤ 2%.
2. $R_{\theta JA}$ is the sum of the junction-to-case and case-to-ambient thermal resistance where the case thermal reference is defined as the solder mounting surface of the drain pins. $R_{\theta JC}$ is guaranteed by design while $R_{\theta JA}$ is determined by the user's board design. $R_{\theta JA}$ shown below for single device operation on FR-4 in still air.
3. Limited by T_{Jmax}, starting T_J=25°C, L=0.1mH, R_g=50Ω, I_D=15A, V_{GS}=10V.

Electrical Characteristics (T_J=25°C unless otherwise noted)

STATIC CHARACTERISTICS						
Parameter	**Symbol**	**Conditions**	**Min.**	**Typ.**	**Max.**	**Unit**
Drain-Source Breakdown Voltage	$V_{(BR)DSS}$	V_{GS}=0V, I_{DS}=10mA	100	-	-	V
Zero Gate Voltage Drain Current	I_{DSS}	V_{DS}=100V, V_{GS}=0V, T_J=25°C	-	-	10	µA
		V_{DS}=100V, V_{GS}=0V, T_J=125°C	-	-	100	µA
Gate-Body Leakage	I_{GSS}	V_{GS}=±20V, V_{DS}=0V	-	-	±100	nA

STATIC CHARACTERISTICS						
Parameter	**Symbol**	**Conditions**	**Min.**	**Typ.**	**Max.**	**Unit**
Gate Threshold Voltage	$V_{GS(TH)}$	V_{DS}=V_{GS}, I_{DS}=250µA	1.2	1.7	2.5	V
Drain-Source On-State Resistance	$R_{DS(ON)}$	V_{GS}=10V, I_{DS}=18A	-	-	17	mΩ
Drain-Source On-State Resistance	$R_{DS(ON)}$	V_{GS}=4.5V, I_{DS}=5A	-	-	23	mΩ
Gate Resistance	R_g	V_{GS}=0V, V_{DS}=0V, f=1MHz	-	0.5	-	Ω
Forward Transconductance	g_{fs}	V_{DS}=5V, I_{DS}=20A	-	20	-	S

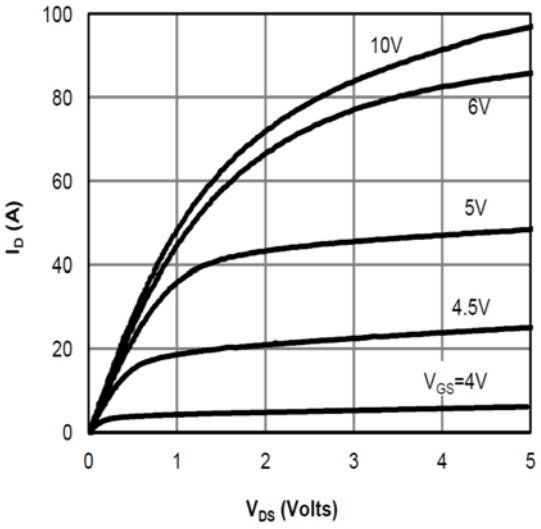
DYNAMIC CHARACTERISTICS						
Parameter	**Symbol**	**Conditions**	**Min.**	**Typ.**	**Max.**	**Unit**
Input Capacitance	C_{iss}	V_{DS}=50V, V_{GS}=0V, f=1MHz	-	955	-	pF
Output Capacitance	C_{oss}	V_{DS}=50V, V_{GS}=0V, f=1MHz	-	172	-	pF
Reverse Transfer Capacitance	C_{rss}	V_{DS}=50V, V_{GS}=0V, f=1MHz	-	30	-	pF
Turn-On Delay Time	$T_{d(on)}$	V_{DS}=50V, V_{GS}=10V, I_{DS}=20A, R_{GEN}=3Ω	-	7.2	-	ns
Rise Time	t_r	V_{DS}=50V, V_{GS}=10V, I_{DS}=20A, R_{GEN}=3Ω	-	11.8	-	ns
Turn-Off Delay Time	$T_{d(off)}$	V_{DS}=50V, V_{GS}=10V, I_{DS}=20A, R_{GEN}=3Ω	-	18.4	-	ns
Fall Time	t_f	V_{DS}=50V, V_{GS}=10V, I_{DS}=20A, R_{GEN}=3Ω	-	4.6	-	ns

GATE CHARGE CHARACTERISTICS						
Parameter	**Symbol**	**Conditions**	**Min.**	**Typ.**	**Max.**	**Unit**
Gate to Source Gate Charge	Q_{gs}	V_{DD}=50V, I_D=20A, V_{GS}=0 to 10V	-	4.27	-	nC
Gate charge at threshold	$Q_{g(th)}$	V_{DD}=50V, I_D=20A, V_{GS}=0 to 10V	-	1.93	-	nC
Gate to Drain Charge	Q_{gd}	V_{DD}=50V, I_D=20A, V_{GS}=0 to 10V	-	5.65	-	nC
Switching charge	Q_{SW}	V_{DD}=50V, I_D=20A, V_{GS}=0 to 10V	-	7.99	-	nC
Gate charge total	Q_g	V_{DD}=50V, I_D=20A, V_{GS}=0 to 10V	-	21.23	-	nC
Gate charge total	Q_g	V_{DD}=50V, I_D=20A, V_{GS}=0 to 4.5V	-	11.39	-	nC
Gate plateau voltage	$V_{plateau}$	V_{DD}=50V, I_D=20A, V_{GS}=0 to 10V	-	3.81	-	V
Gate charge total, sync. FET (Q_g- Q_{gd})	$Q_{g(sync)}$	V_{DS}=0.1V, V_{GS}=0 to 10V	-	15.58	-	nC

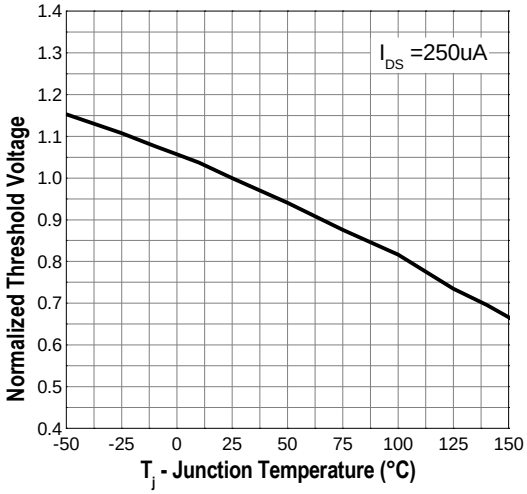
DRAIN-SOURCE DIODE CHARACTERISTICS AND MAXIMUM RATINGS						
Parameter	**Symbol**	**Conditions**	**Min.**	**Typ.**	**Max.**	**Unit**
Diode continuous forward current (Body Diode)	I_S	T_C=25°C	-	-	54	A
Diode pulse current (Body Diode)	I_{SM}	T_C=25°C	-	-	100	A
Diode Forward Voltage	V_{SD}	V_{GS}=0V, I_F=20A	-	0.7	1.2	V
Body Diode Reverse Recovery Time	t_{rr}	V_{DD}=50V, I_F=20A, di/dt=100A/µs	-	49	-	ns
		V_{DD}=50V, I_F=20A, di/dt=200A/µs	-	29	-	ns
Body Diode Reverse Recovery Charge	Q_{rr}	V_{DD}=50V, I_F=20A, di/dt=100A/µs	-	89	-	nC
		V_{DD}=50V, I_F=20A, di/dt=200A/µs	-	69	-	nC

Typical Operating Characteristics

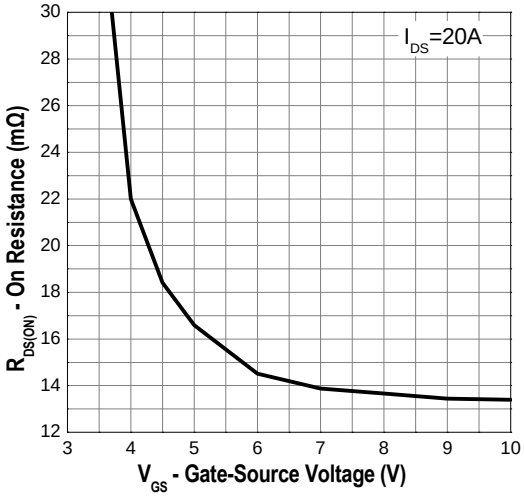
Output Characteristics



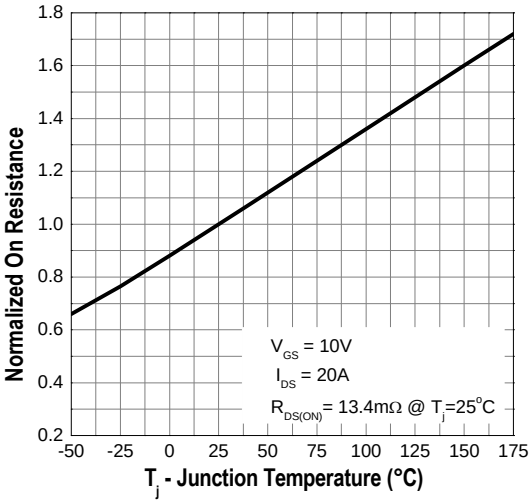
Gate Threshold Voltage



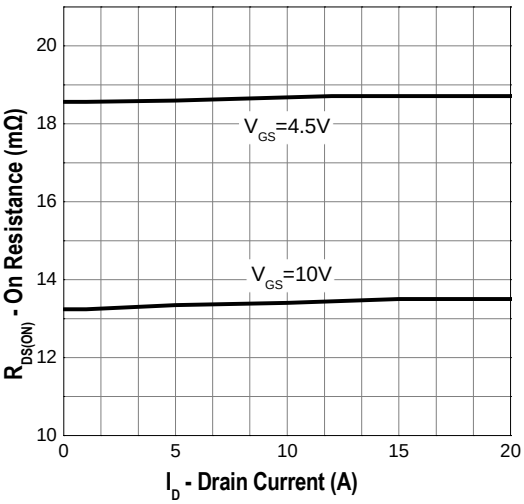
Gate-Source On Resistance



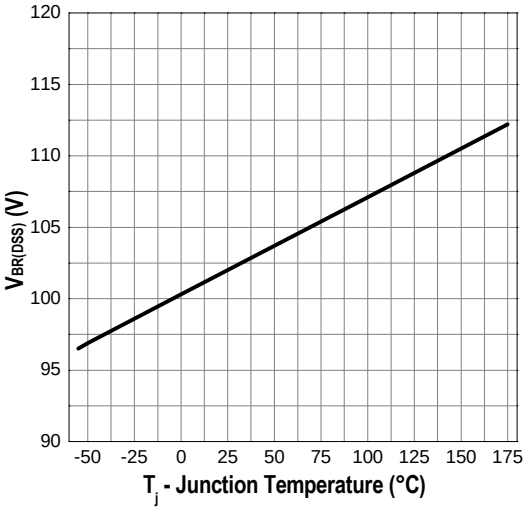
Drain-Source On Resistance



Drain-Source On Resistance

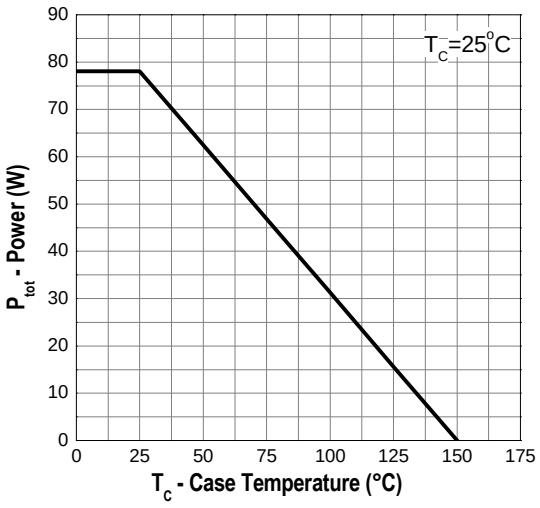


Drain-source Breakdown Voltage

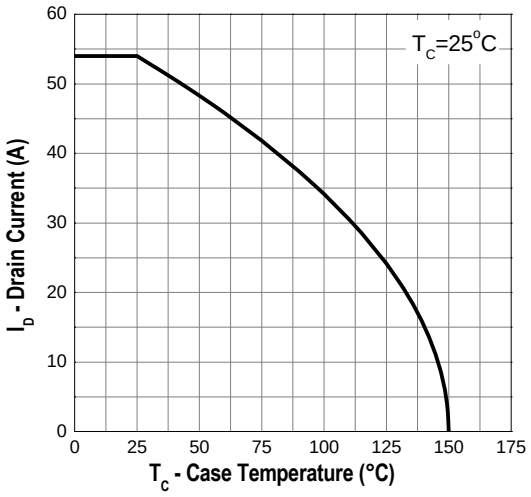


Typical Operating Characteristics (Cont.)

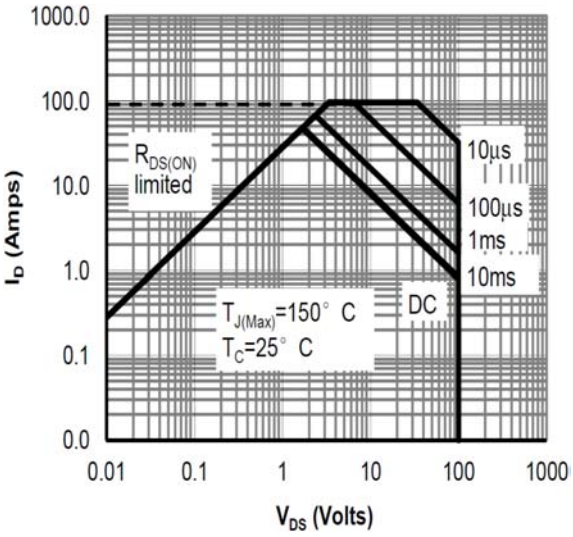
Power Dissipation



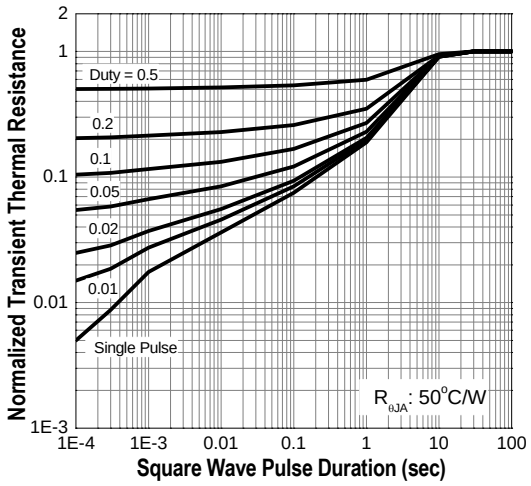
Drain Current



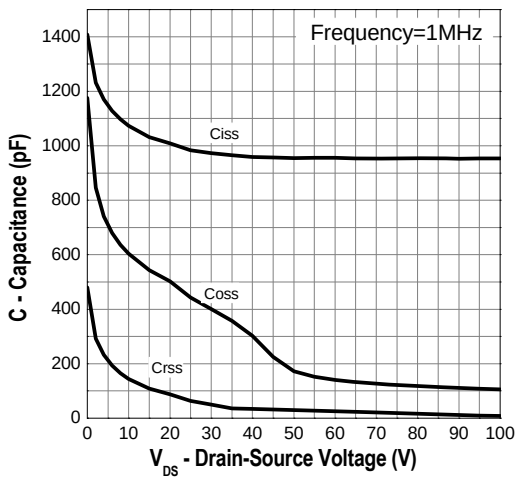
Safe Operation Area



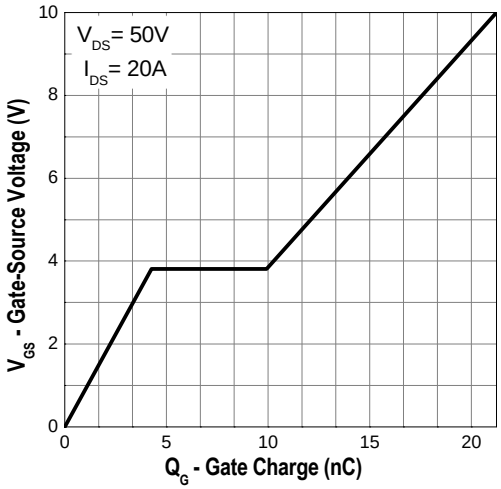
Transient Thermal Impedance



Capacitance



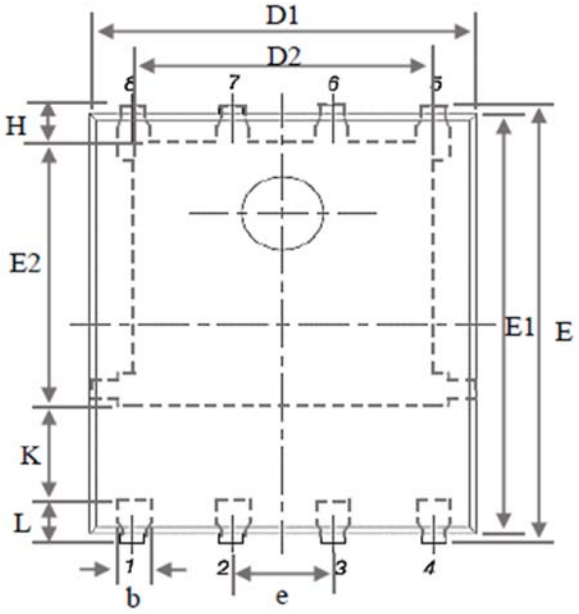
Gate Charge

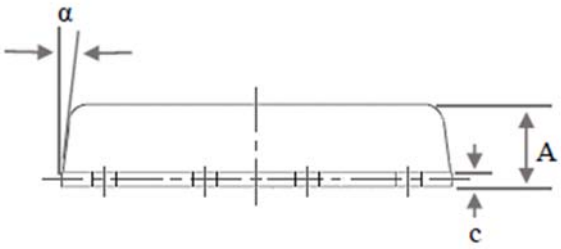


Marking Information

PDFN 5x6-8L (Q)	Marking Rule
Laser Marking  	Line 1：Device DG100N14Q Line 2：Date Code YYMMXXX YY：Year Code MM：Month Code XXX：Serial Number

Package of Dimension



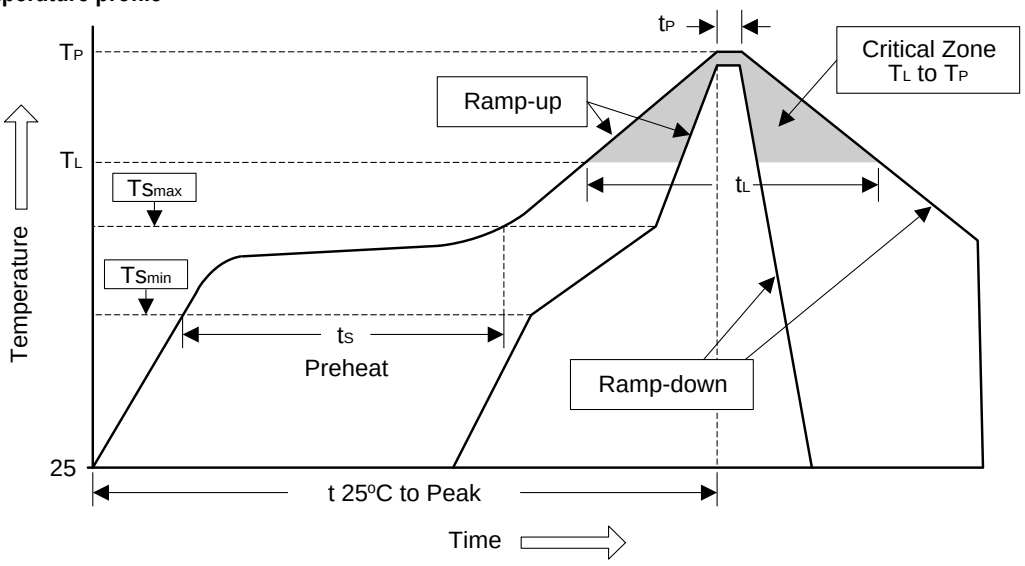


Symbol	Min	Nor	Max
A	0.90	1.04	1.17
b	0.33	0.42	0.51
C	0.06	0.20	0.35
D1	4.80	5.10	5.40
D2	3.61	3.96	4.31
E	5.90	6.03	6.15
E1	5.65	5.75	5.85
E2	3.30	3.54	3.78
e	1.27 BSC		
H	0.38	0.50	0.61
L	0.38	0.55	0.71
L1	0.05	0.15	0.25

Soldering Methods for Silicongear's Products

1. Storage environment: Temperature=10°C to 35°C Humidity=65%±15%
2. Reflow soldering of surface-mount devices

Figure 1: Temperature profile



Profile Feature	Sn-Pb Eutectic Assembly	Pb-Free Assembly
Average ramp-up rate (T_L to T_P)	<3°C/sec	<3°C/sec
Preheat - Temperature Min (Ts_{min}) - Temperature Max (Ts_{max}) - Time (min to max) (ts)	 100°C 150°C 60 to 120 sec	 150°C 200°C 60 to 180 sec
Tsmax to T_L - Ramp-up Rate	 <3°C/sec	 <3°C/sec
Time maintained above: - Temperature (T_L) - Time (t_L)	 183°C 60 to 150 sec	 217°C 60 to 150 sec
Peak Temperature (T_P)	240°C +0/-5°C	260°C +0/-5°C
Time within 5°C of actual Peak Temperature (t_P)	10 to 30 sec	20 to 40 sec
Ramp-down Rate	<6°C/sec	<6°C/sec
Time 25°C to Peak Temperature	<6 minutes	<8 minutes

3. Flow (wave) soldering (solder dipping)

Products	Peak Temperature	Dipping Time
Pb devices.	245°C ±5°C	5sec ±1sec
Pb-Free devices.	260°C +0/-5°C	5sec ±1sec

Important Notice

ALL PRODUCT, PRODUCT SPECIFICATIONS AND DATA ARE SUBJECT TO CHANGE WITHOUT NOTICE TO IMPROVE RELIABILITY, FUNCTION OR DESIGN OR OTHERWISE.

Silicongear cannot assume responsibility for use of any circuitry other than circuitry entirely embodied in an Silicongear product. No circuit patent licenses, copyrights, mask work rights, or other intellectual property rights are implied.

Silicongear Corporation, its affiliates, agents, and employees, and all persons acting on its or their behalf (collectively, "Silicongear"), disclaim any and all liability for any errors, inaccuracies or incompleteness contained in any datasheet or in any other disclosure relating to any product.

Silicongear makes no warranty, representation or guarantee regarding the suitability of the products for any particular purpose or the continuing production of any product. To the maximum extent permitted by applicable law, Silicongear disclaims (i) any and all liability arising out of the application or use of any product, (ii) any and all liability, including without limitation special, consequential or incidental damages, and (iii) any and all implied warranties, including warranties of fitness for particular purpose, non-infringement and merchantability.

Statements regarding the suitability of products for certain types of applications are based on Silicongear's knowledge of typical requirements that are often placed on Silicongear products in generic applications. Such statements are not binding statements about the suitability of products for a particular application. It is the customer's responsibility to validate that a particular product with the properties described in the product specification is suitable for use in a particular application. Parameters provided in datasheets and/or specifications may vary in different applications and performance may vary over time. All operating parameters, including typical parameters, must be validated for each customer application by the customer's technical experts. Product specifications do not expand or otherwise modify Silicongear's terms and conditions of purchase, including but not limited to the warranty expressed therein.

Except as expressly indicated in writing, Silicongear products are not designed for use in medical, life-saving, or life-sustaining applications or for any other application in which the failure of the Silicongear product could result in personal injury or death. Customers using or selling Silicongear products not expressly indicated for use in such applications do so at their own risk and agree to fully indemnify and hold Silicongear and its distributors harmless from and against any and all claims, liabilities, expenses and damages arising or resulting in connection with such use or sale, including attorneys fees, even if such claim alleges that Silicongear or its distributor was negligent regarding the design or manufacture of the part. Please contact authorized Silicongear personnel to obtain written terms and conditions regarding products designed for such applications.

No license, express or implied, by estoppel or otherwise, to any intellectual property rights is granted by this document or by any conduct of Silicongear. Product names and markings noted herein may be trademarks of their respective owners.

Silicongear and the Silicongear logo are trademarks of Silicongear Corporation. All other brand and product names appearing in this document are registered trademarks or trademarks of their respective holders.