

Key Performance Parameters		
Parameter	Value	Unit
V_{DS}	100	V
$R_{DS(ON) \text{ max. } V_{GS}=10V}$	3.6	mΩ
$R_{DS(ON) \text{ max. } V_{GS}=4.5V}$	4.8	mΩ
I_D	100	A
$Q_g, V_{GS}=0 \text{ to } 10V$	119.13	nC
Q_{gd}	38.46	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
DG100N02LQ	Halogen-Free	PDFN 5x6-8L	Q	Tape & Reel	2,500

Absolute Maximum Ratings ($T_J=25^\circ\text{C}$ 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	100	A
	T _C =100°C		100	A
Drain Current-Pulsed ^{Note 1}	T _C =25°C	I_{DM}	400	A
Avalanche Current		I_{AR}	50	A
Single Pulse Avalanche Energy ^{Note 3}		E_{AS}	625	mJ
Maximum Power Dissipation	T _C =25°C	P_{tot}	156	W
Operating and Storage Temperature Range		T_J, T_{STG}	-55 to +175	°C

Thermal Resistance Ratings

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
Junction-to-Ambient ^{Note 2}	$R_{\theta JA}$	Steady State	-	-	62	$^\circ\text{C/W}$
Thermal resistance, Junction-to-Case	$R_{\theta JC}$	Steady State	-	-	0.8	$^\circ\text{C/W}$

Notes:

- Pulse Test: Pulse Width $\leq 300\mu\text{s}$, Duty Cycle $\leq 2\%$.
- $R_{\theta JA}$ 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.
- Limited by T_{Jmax} , starting $T_J=25^\circ\text{C}$, $L=0.5\text{mH}$, $R_g=50\Omega$, $I_D=50\text{A}$, $V_{GS}=10\text{V}$.

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}	$V_{DS}=100V, V_{GS}=0V, T_J=25^{\circ}C$	-	-	10	μA
		$V_{DS}=100V, V_{GS}=0V, T_J=125^{\circ}C$	-	-	100	μA
Gate-Body Leakage	I_{GSS}	$V_{GS}=\pm 20V, V_{DS}=0V$	-	-	±100	nA

STATIC CHARACTERISTICS						
Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
Gate Threshold Voltage	$V_{GS(TH)}$	$V_{DS}=V_{GS}, I_{DS}=250\mu A$	1.2	1.6	2.4	V
Drain-Source On-State Resistance	$R_{DS(ON)}$	$V_{GS}=10V, I_{DS}=50A$	-	-	3.6	mΩ
Drain-Source On-State Resistance	$R_{DS(ON)}$	$V_{GS}=4.5V, I_{DS}=25A$	-	-	4.8	mΩ
Gate Resistance	R_g	$V_{GS}=0V, V_{DS}=0V, f=1MHz$	-	1	-	Ω
Forward Transconductance	g_{fs}	$V_{DS}=5V, I_{DS}=50A$	-	85	-	S

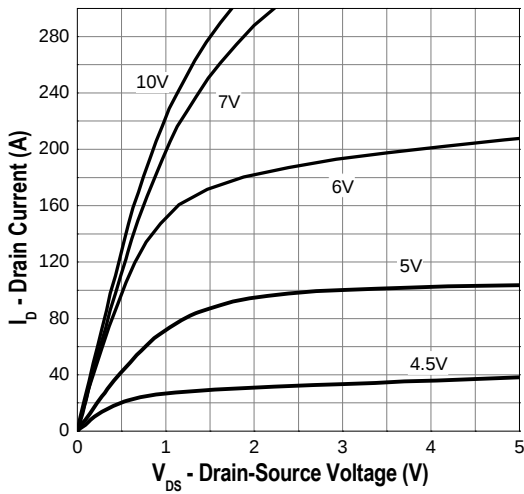
DYNAMIC CHARACTERISTICS						
Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
Input Capacitance	C_{iss}	$V_{DS}=50V, V_{GS}=0V, f=1MHz$	-	6536	-	pF
Output Capacitance	C_{oss}	$V_{DS}=50V, V_{GS}=0V, f=1MHz$	-	742	-	pF
Reverse Transfer Capacitance	C_{rss}	$V_{DS}=50V, V_{GS}=0V, f=1MHz$	-	7	-	pF
Turn-On Delay Time	$T_{d(on)}$	$V_{DS}=50V, V_{GS}=10V, I_{DS}=50A, R_{GEN}=3\Omega$	-	14.6	-	ns
Rise Time	t_r	$V_{DS}=50V, V_{GS}=10V, I_{DS}=50A, R_{GEN}=3\Omega$	-	64	-	ns
Turn-Off Delay Time	$T_{d(off)}$	$V_{DS}=50V, V_{GS}=10V, I_{DS}=50A, R_{GEN}=3\Omega$	-	87.8	-	ns
Fall Time	t_f	$V_{DS}=50V, V_{GS}=10V, I_{DS}=50A, R_{GEN}=3\Omega$	-	119.4	-	ns

GATE CHARGE CHARACTERISTICS						
Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
Gate to Source Gate Charge	Q_{gs}	$V_{DD}=50V, I_D=50A, V_{GS}=0 \text{ to } 10V$	-	22.86	-	nC
Gate charge at threshold	$Q_{g(th)}$	$V_{DD}=50V, I_D=50A, V_{GS}=0 \text{ to } 10V$	-	14.25	-	nC
Gate to Drain Charge	Q_{gd}	$V_{DD}=50V, I_D=50A, V_{GS}=0 \text{ to } 10V$	-	38.46	-	nC
Switching charge	Q_{SW}	$V_{DD}=50V, I_D=50A, V_{GS}=0 \text{ to } 10V$	-	47.07	-	nC
Gate charge total	Q_g	$V_{DD}=50V, I_D=50A, V_{GS}=0 \text{ to } 10V$	-	119.13	-	nC
Gate charge total	Q_g	$V_{DD}=50V, I_D=50A, V_{GS}=0 \text{ to } 4.5V$	-	68.85	-	nC
Gate plateau voltage	$V_{plateau}$	$V_{DD}=50V, I_D=50A, V_{GS}=0 \text{ to } 10V$	-	3.43	-	V
Gate charge total, sync. FET ($Q_g - Q_{gd}$)	$Q_{g(sync)}$	$V_{DS}=0.1V, V_{GS}=0 \text{ to } 10V$	-	80.67	-	nC

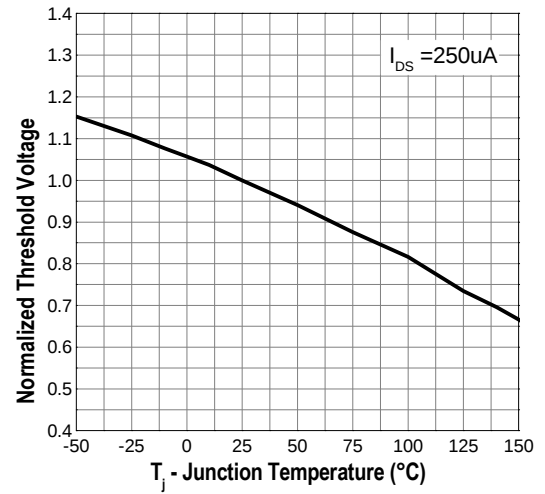
DRAIN-SOURCE DIODE CHARACTERISTICS AND MAXIMUM RATINGS						
Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
Diode continuous forward current (Body Diode)	I_S	$T_C=25^{\circ}C$	-	-	100	A
Diode pulse current (Body Diode)	I_{SM}	$T_C=25^{\circ}C$	-	-	400	A
Diode Forward Voltage	V_{SD}	$V_{GS}=0V, I_F=50A$	-	0.9	1.3	V
Body Diode Reverse Recovery Time	t_{rr}	$V_{DD}=50V, I_F=50A, di/dt=100A/\mu s$	-	48	-	ns
		$V_{DD}=50V, I_F=50A, di/dt=200A/\mu s$	-	52.73	-	ns
Body Diode Reverse Recovery Charge	Q_{rr}	$V_{DD}=50V, I_F=50A, di/dt=100A/\mu s$	-	45.27	-	nC
		$V_{DD}=50V, I_F=50A, di/dt=200A/\mu s$	-	107.24	-	nC

Typical Operating Characteristics

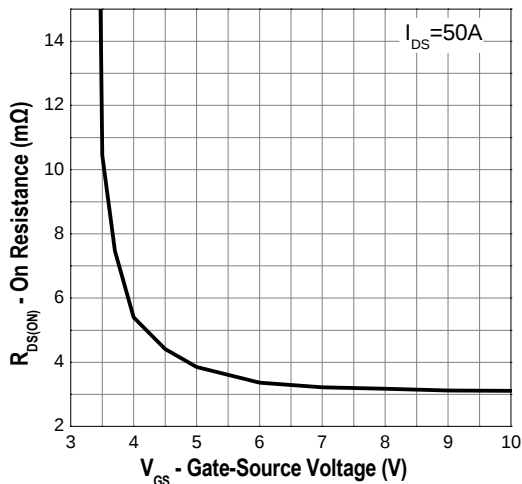
Output Characteristics



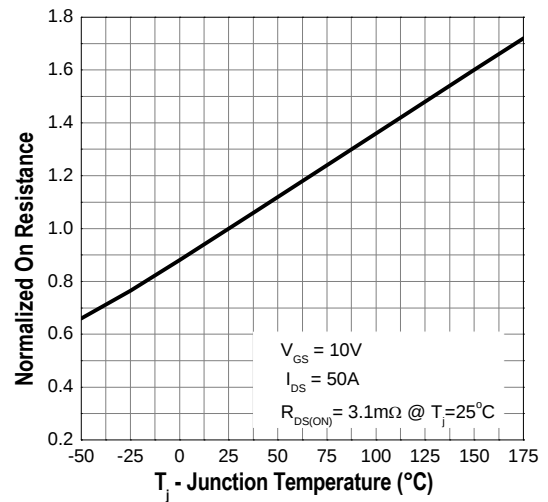
Gate Threshold Voltage



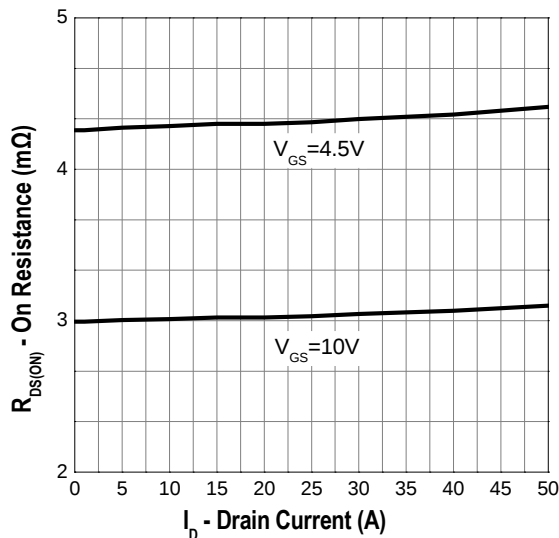
Gate-Source On Resistance



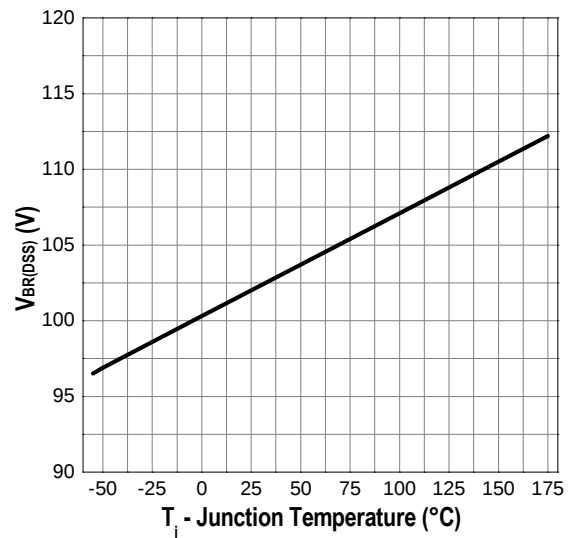
Drain-Source On Resistance



Drain-Source On Resistance

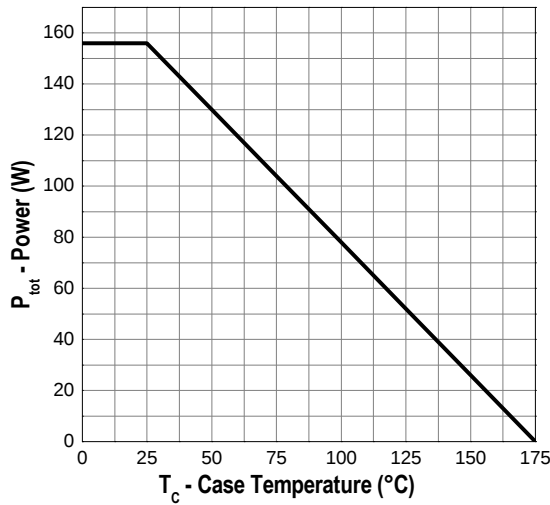


Drain-source Breakdown Voltage

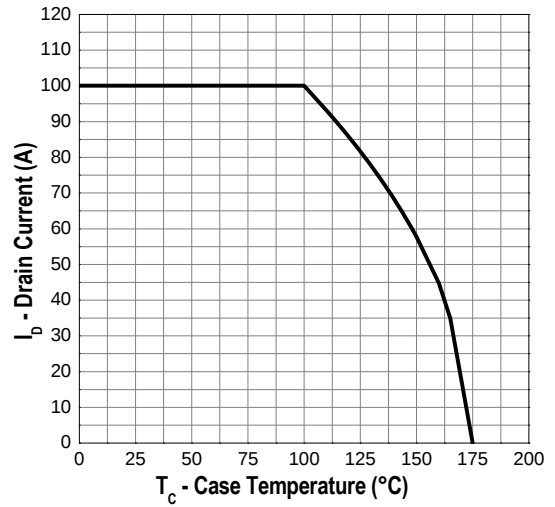


Typical Operating Characteristics (Cont.)

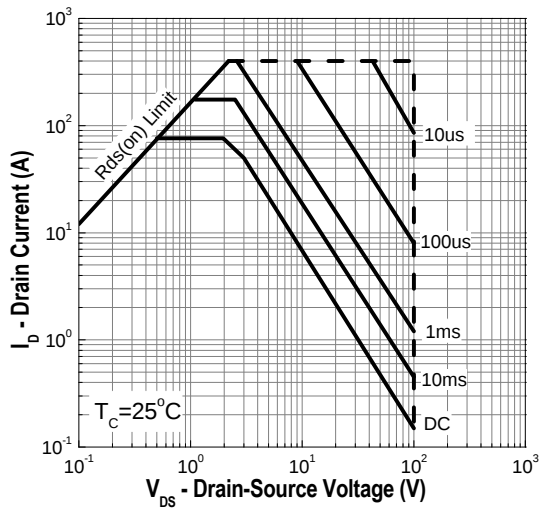
Power Dissipation



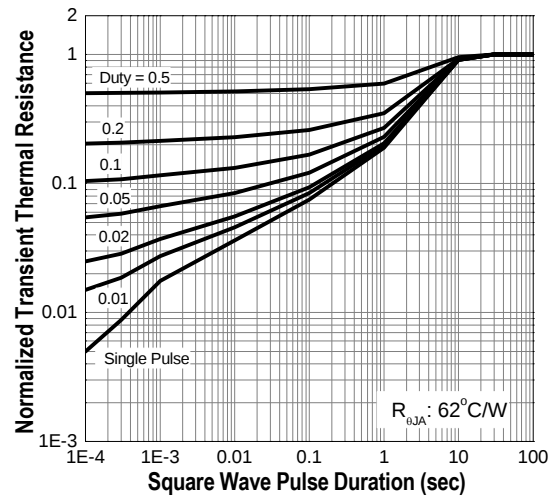
Drain Current



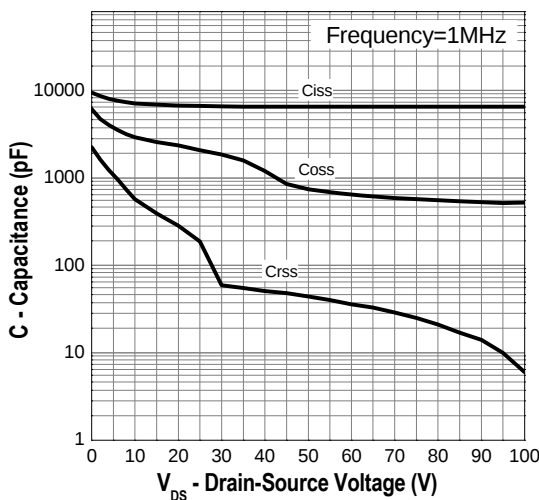
Safe Operation Area



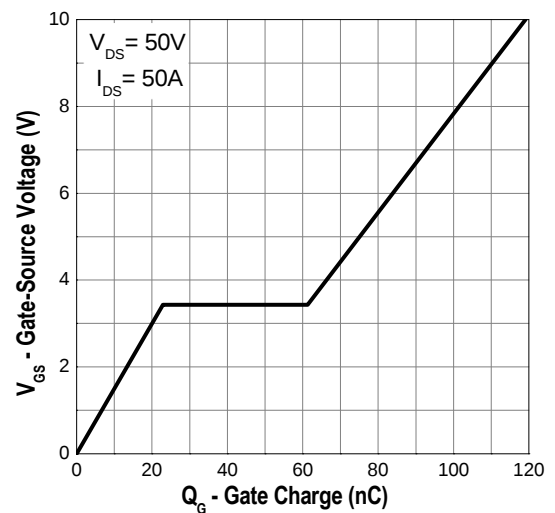
Transient Thermal Impedance



Capacitance



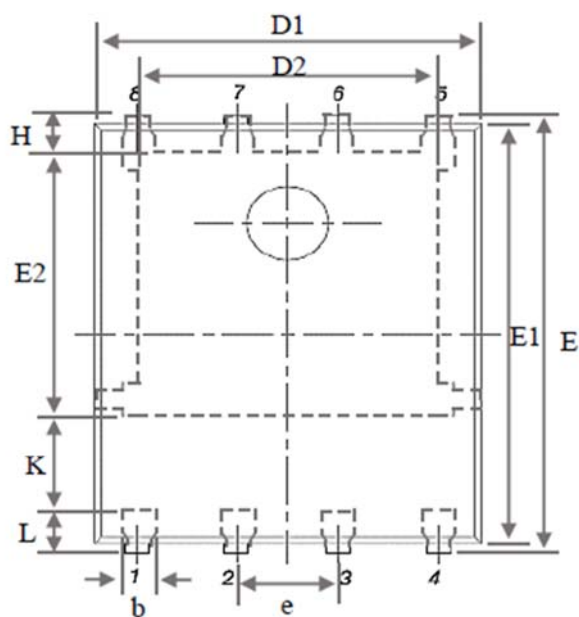
Gate Charge



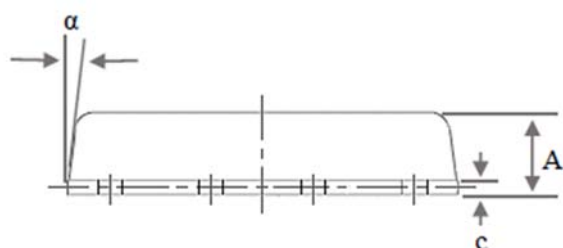
Marking Information

PDFN 5x6-8L (Q)	Marking Rule
Laser Marking 	<u>Line 1</u> : Device DG100N02LQ <u>Line 2</u> : Date Code YYMMXXX YY : Year Code MM : Month Code XXX : Serial Number

Package of Dimension



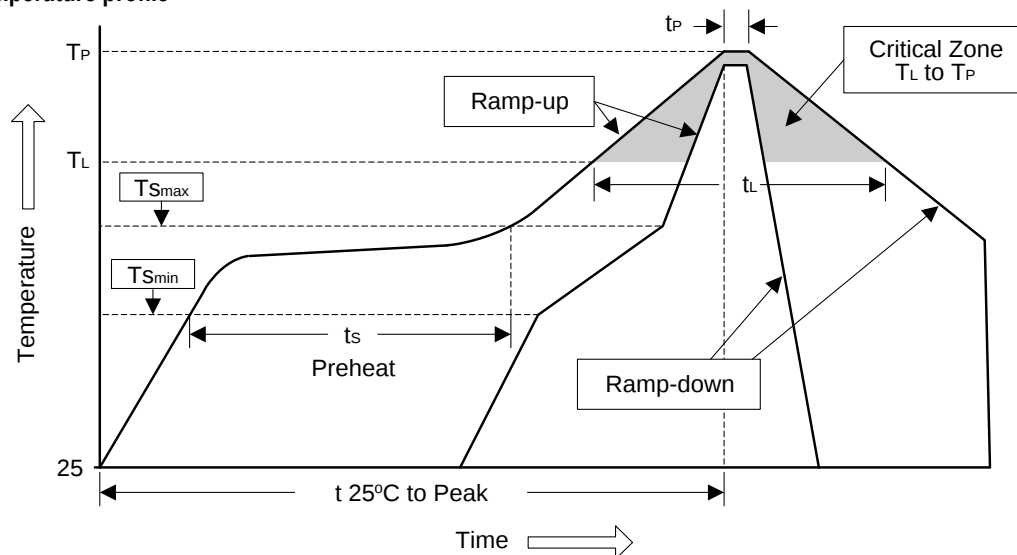
Symbol	Min	Nor	Max
A	0.90	1.04	1.17
b	0.33	0.42	0.51
C	0.06	0.20	0.35
D1	4.80	5.10	5.40
D2	3.61	3.96	4.31
E	5.90	6.03	6.15
E1	5.65	5.75	5.85
E2	3.30	3.54	3.78
e	1.27 BSC		
H	0.38	0.50	0.61
L	0.38	0.55	0.71
L1	0.05	0.15	0.25



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 (T_{smin})	100°C	150°C
- Temperature Max (T_{smax})	150°C	200°C
- Time (min to max) (t_s)	60 to 120 sec	60 to 180 sec
T_{smax} to T_L		
- Ramp-up Rate	<3°C/sec	<3°C/sec
Time maintained above:		
- Temperature (T_L)	183°C	217°C
- Time (t_L)	60 to 150 sec	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

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