DIO1568
Low Power, Dual SIM Card Analog Switch

Features

- Switch type: SPDT (4X)
- Voltage operation: 1.65 V to 5.5 V
- Low on-resistance: 0.85 Ω at SIM path; 2.7 Ω at other paths
- 20 pF C_{ON} at DAT/CLK/RST path
- Low power consumption
- ESD HBM ±7 kV
- ESD CDM ±2 kV
- Packaged: 16-Lead QFN1.8*2.6 and 16-Lead QFN3*3

Descriptions

The DIO1568 is a quad single-pole, double-throw (SPDT) analog switch targeted at dual SIM card multiplexing. The DIO1568 operates from a single 1.65 V to 5.5 V supply and features an ultra-low on-resistance of 0.85 Ω at SIM path to ensure minimal voltage drop in other paths. This device is fabricated with sub-micron CMOS technology to achieve fast switching speeds and is designed for break-before-make operation.

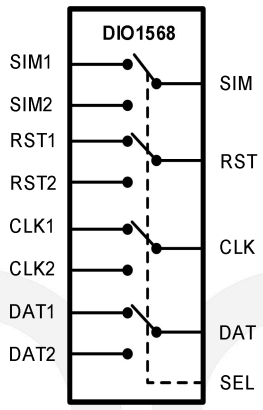
The DIO1568 features a very low quiescent current even when the control voltage is lower than the V_{CC} supply. This allows mobile handset applications direct interface with the baseband processor general-purpose I/Os.

The DIO1568 provides two Green packages: QFN1.8*2.6-16 and QFN3*3-16.

Applications

- Cell-phones/PDAs
- Set-top boxes
- Digital cameras
- Notebooks
- TV/ LCD monitors

Block Diagram

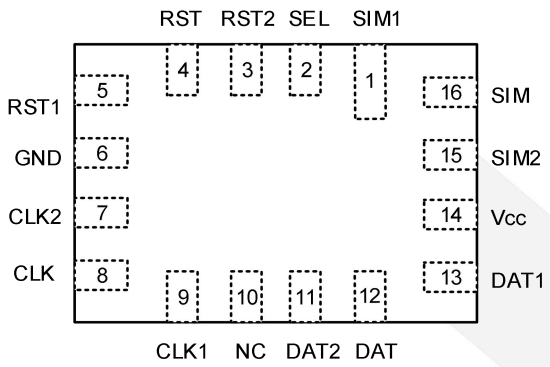


Ordering Information

Part Number	Top Marking	RoHS	T_A	Package	
DIO1568LN16	DE6H	Green	-40 to 125°C	QFN1.8*2.6-16	Tape & Reel, 3000
DIO1568CL16	DAE6H	Green	-40 to 125°C	QFN3*3-16	Tape & Reel, 5000

Pin Assignment

QFN1.8*2.6-16



QFN3*3-16

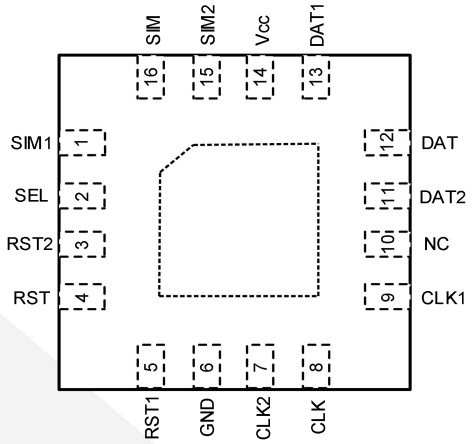


Figure 1. Top view

Pin Descriptions

Pin No.	Pin Name	Description
3, 4, 5, 7, 8, 9,	DATn, RSTn, CLKn	Data input
1, 15	SIMn	SIM input
11, 12, 13, 16	SIM, DAT, CLK, RST	Common port
2	SEL	Select
6, 14	V_{CC} / GND	Power
10	NC	Not connected

Truth Table

SEL	Function
L	SIM = SIM1, DAT = DAT1, RST = RST1, CLK = CLK1
H	SIM = SIM2, DAT = DAT2, RST = RST2, CLK = CLK2

Absolute Maximum Ratings

Stresses beyond those listed under the Absolute Maximum Rating table may cause permanent damage to the device. These are stress ratings only and functional operation of the device at these or any other condition beyond those indicated in the operational sections of the specifications is not implied. Exposure to absolute maximum rating conditions for extended periods may affect device reliability. DIOO does not recommend exceeding them or designing to absolute maximum ratings.

Symbol	Parameter	Min	Max	Unit
V_{CC}	Supply voltage	-0.5	6	V
V_S	Switch voltage	-0.5	V_{CC} + 0.3	V
V_{IN}	Control input voltage (SEL)	-0.5	V_{CC}	V
I_{IK}	DC input diode current	-50		mA
I_{OUT}	DC output current (DAT, CLK, RST)		50	mA
I_{SIM}	DC output current (SIM)		150	mA
I_{Peak}	Peak current (pulsed at 1 ms,10% duty cycle)		500	mA
P_D	Continuous power dissipation (T_A = 125°C) (15.6 mW/°C above 125°C)		1.25	W
T_{STG}	Storage temperature range	-65	150	°C
T_J	Junction temperature		150	°C
T_L	Lead temperature (soldering 10 s)		260	°C
ESD	Human body model (HBM), per ANSI/ESDA/JEDEC JS-001 (1)		±7	kV
	Charged-device model (CDM), per JEDEC specification JESD22-C101 (2)		±2	kV

Note:

(1) JEDEC document JEP155 states that 500 V HBM allows safe manufacturing with a standard ESD control process.

(2) JEDEC document JEP157 states that 250 V CDM allows safe manufacturing with a standard ESD control process.

Recommend Operating Conditions

Recommended Operating Conditions table defines the conditions for actual device operation. Recommended operating conditions are specified to ensure optimal performance to the datasheet specifications.

Symbol	Parameter	Min	Max	Unit
V_{CC}	Supply voltage	1.65	5.5	V
V_{IN}	Control input voltage (SEL)	0	V_{CC}	V
V_S	Switch voltage	0	V_{CC}	V
T_A	Operating temperature	-40	125	°C

DC Electrical Characteristics

All typical value is at 25°C unless otherwise specified.

Symbol	Parameter	Conditions	V_{CC} (V)	Temp	Min	Typ	Max	Unit
V_{IH}	Input voltage high		1.65 to 5.5	-40 to 125°C	0.9			V
				25°C		0.6		V
V_{IL}	Input voltage low		1.65 to 5.5	-40 to 125°C			0.3	V
I_{IN}	Control input leakage	V_{SW} = 0 to V_{CC}	5.5	25°C	-1		1	μA
$I_{NC(OFF)}$ $I_{NO(OFF)}$	Off leakage current	RSTn, DATn, CLKn, SIMn = 0.3 or 3.6 V	5.5	25°C	-1		1	μA
$I_{NC(ON)}$ $I_{NO(ON)}$	ON leakage current	RSTn, DATn, CLKn, SIMn = 0.3 or 3.6 V	5.5	25°C	-1		1	μA
I_{CC}	Quiescent supply current	V_{IN} = 0 V or V_{CC}, I_{OUT} = 0 V	5.5	-40 to 125°C		0.6	1.5	μA
				25°C		0.5	1	μA
$R_{ON\_D/C/R}$	RST, DAT, CLK resistance	I_{OUT} = -20 mA, V_{SW} = 2.3 V	3.3	-40 to 125°C		2.7		Ω
R_{ON_S}	SIM resistance	I_{OUT} = -100 mA, V_{SW} = 2.3 V	3.3	-40 to 125°C		0.85		Ω
$\Delta R_{ON\_D/C/R}$	RST, DAT, CLK delta on-resistance	V_{SW} = 2.3 V, I_{ON} = -20 mA	3.3	25°C		0.2		Ω
ΔR_{ON_S}	SIM delta on-resistance	V_{SW} = 2.3 V, I_{ON} = -100 mA	3.3	25°C		0.2		Ω
$R_{FLAT(ON)\_D/C/R}$	RST, DAT, CLK on-resistance flatness	I_{OUT} = -20 mA, RSTn, CLKn, DATn = 0 to V_{CC}	3.3	25°C		2		Ω
$R_{FLAT(ON)\_S}$	SIM on-resistance flatness	I_{OUT} = -100 mA, SIMn = 0 to V_{CC}	3.3	25°C		0.45		Ω
I_{CCT}	Increase in I_{CC} current per control voltage and V_{CC}	V_{IN} = 0.8 V	5.5	25°C		1		μA
		V_{IN} = 1.5 V	5.5	25°C		0.61		μA

Capacitance

Symbol	Parameter	Conditions	Temp	Min	Typ	Max	Unit
$C_{ON\_D/C/R}$	DAT, CLK, RST on capacitance	V_{CC} = 3.6 V, f = 1 MHz	25°C		20		pF
C_{ON_S}	SIM on capacitance	V_{CC} = 3.6 V, f = 1 MHz	25°C		100		pF

AC Electrical Characteristics

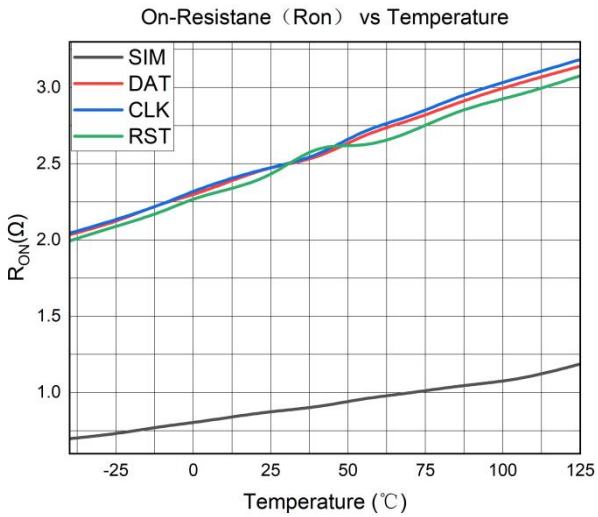
All typical value are for V_{CC} = 3.3 V at 25°C unless otherwise specified.

Symbol	Parameter	Conditions	V_{CC}(V)	Temp	Min	Typ	Max	Unit
$t_{ON\_D/C/R}$	Turn-on time (DAT, CLK, RST)	R_L = 50 Ω, C_L = 35 pF, V_{SW} = 1.5 V	3.3	25°C		90		ns
$t_{OFF\_D/C/R}$	Turn-off time (DAT, CLK, RST)	R_L = 50 Ω, C_L = 35 pF, V_{SW} = 1.5 V	3.3	25°C		60		ns
t_{ON_S}	Turn-on time (SIM)	R_L = 50 Ω, C_L = 35 pF, V_{SW} = 1.5 V	3.3	25°C		90		ns
t_{OFF_S}	Turn-off time (SIM)	R_L = 50 Ω, C_L = 35 pF, V_{SW} = 1.5 V	3.3	25°C		60		ns
t_{BBM}	Break-before-make	R_L = 50 Ω, C_L = 35 pF, V_{SW} = 1.5 V	3.3	25°C		50		ns
t_{PD}	Propagation delay	R_L = 50 Ω, C_L = 35 pF	3.3	25°C			0.5	ns
OIRR	Off isolation (DAT, CLK, RST)	R_L = 50 Ω, f = 10 MHz	2.7 to 3.6	25°C		-50		dB
Xtalk	Non-adjacent channel crosstalk (DAT, CLK, RST)	R_L = 50 Ω, f = 10 MHz	2.7 to 3.6	25°C		-75		dB
BW	-3dB bandwidth (DAT, CLK, RST)	R_L= 50 Ω, C_L = 5 pF	2.7 to 3.6	25°C		200		MHz
	-3 dB bandwidth (SIM)	R_L = 50 Ω, C_L = 5 pF	2.7 to 3.6	25°C		60		MHz

Note:

(1)Specifications subject to change without notice.

Typical Performance Characteristics



V_{CC} = 3.3 V, V_{SW} = 2.3 V

Figure 2. On-resistance (R_{ON}) vs. Temperature

Test Diagrams

In the following test circuits, “A” stands for SIM, DAT, CLK, RST; “Bn” stands for SIMn, DATn, CLKn, RSTn.

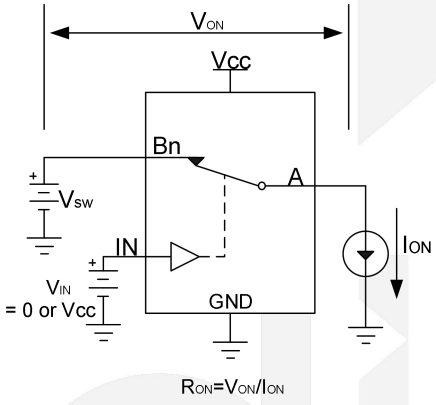


Figure 3. Switch-on resistor

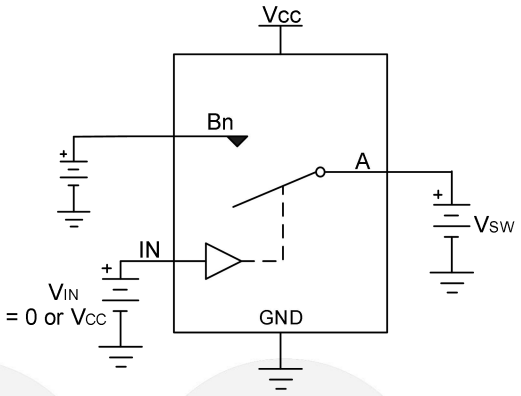


Figure 4. Switch-off leakage

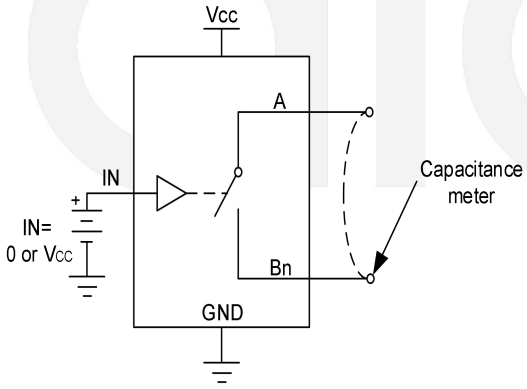


Figure 5. On capacitance test

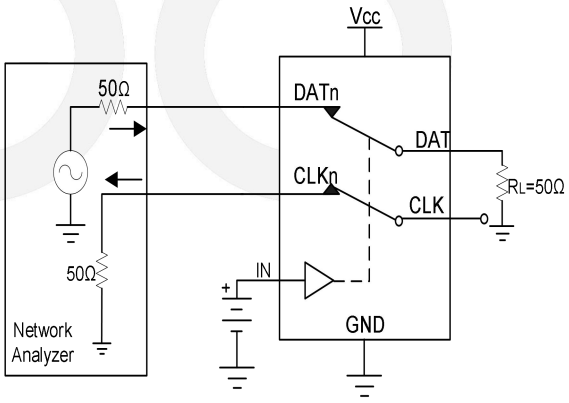


Figure 6. Channel-to-channel crosstalk

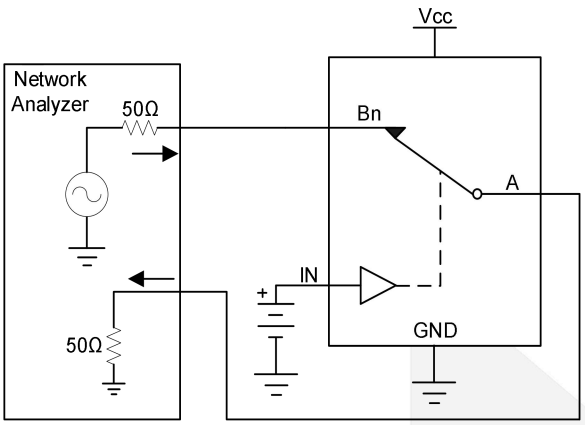


Figure 7. Bandwidth

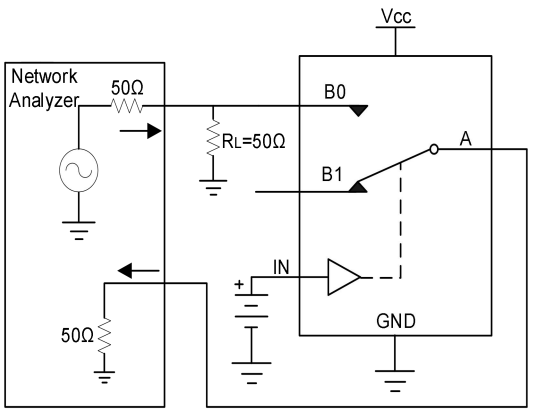


Figure 8. Off-isolation

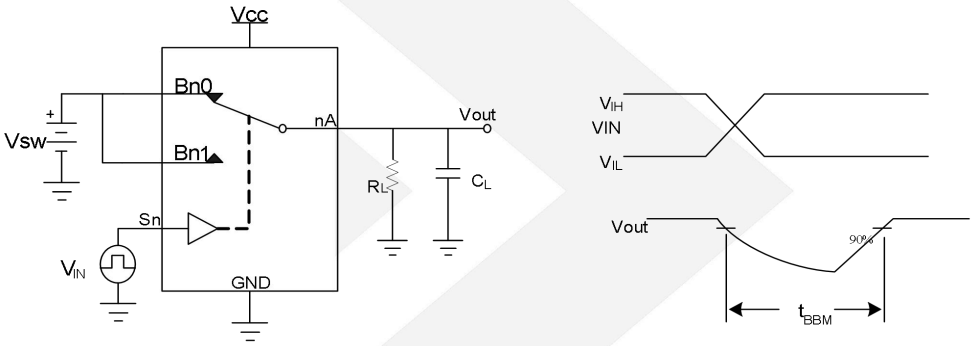


Figure 9. Break-before-make

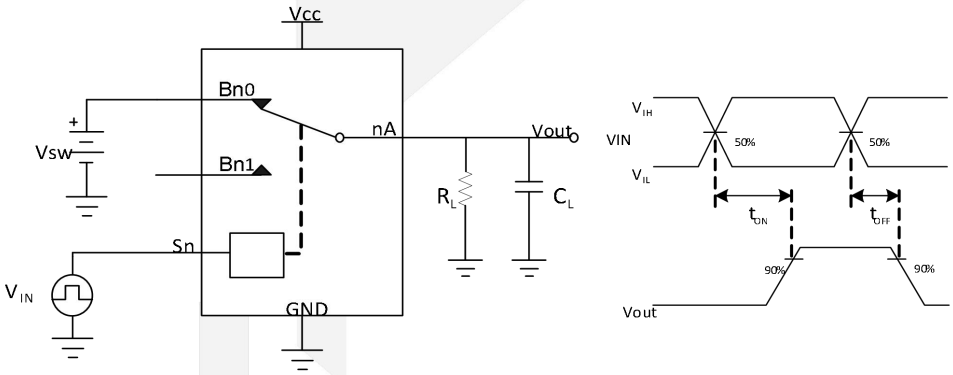
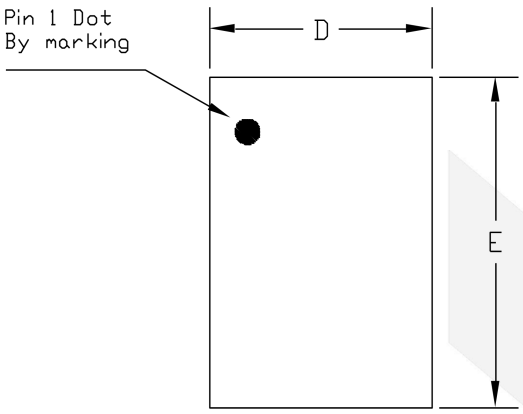
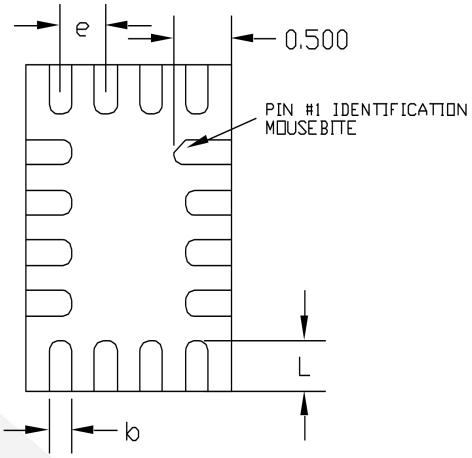


Figure 10. Turn-on/Turn-off

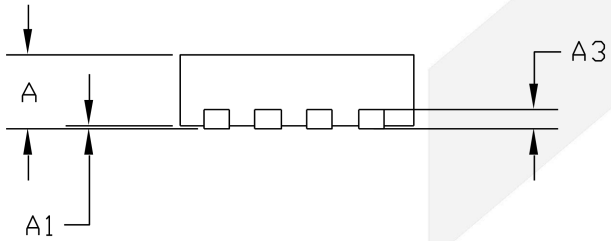
Physical Dimensions: QFN1.8*2.6-16



TOP VIEW



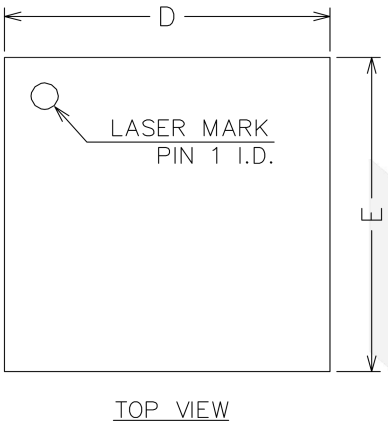
BOTTOM VIEW



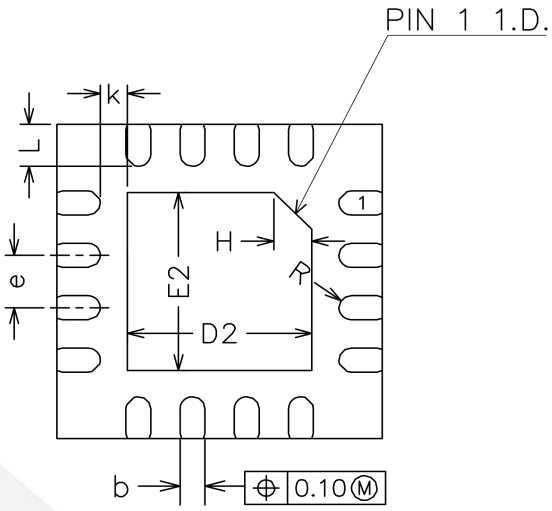
SIDE VIEW

Common Dimensions (Units of Measure = Millimeter)			
Symbol	**Min**	**Nom**	**Max**
A	>0.50	0.55	0.60
A1	0.00	-	0.05
A3		0.15 REF	
D	1.75	1.80	1.85
E	2.55	2.60	2.65
L	0.35	0.40	0.45
b	0.15	0.20	0.25
e		0.40 BSC	

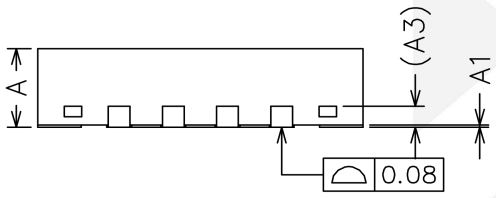
Physical Dimensions: QFN3*3-16



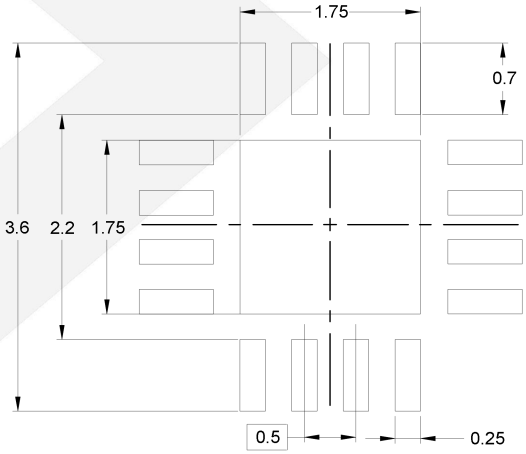
TOP VIEW



BOTTOM VIEW



SIDE VIEW



RECOMMENDED LAND PATTERN(Unit:mm)

Common Dimensions (Units of Measure = Millimeter)			
Symbol	**Min**	**Nom**	**Max**
A	0.70	0.75	0.80
A1	0.00	0.02	0.05
A3		0.20 REF	
b	0.18	0.23	0.28
D	2.90	3.00	3.10
E	2.90	3.00	3.10
D2	1.60	1.70	1.80
E2	1.60	1.70	1.80
e	0.40	0.50	0.60
H		0.35 REF	
K	0.15	0.25	0.35
L	0.30	0.40	0.50
R	0.09	-	-

CONTACT US

Dioo is a professional design and sales corporation for high-quality and performance analog semiconductors. The company focuses on industry markets, such as cell phones, handheld products, laptops, medical equipment, and so on. Dioo's product families include analog signal processing and amplifying, LED drivers, and charger ICs. Go to http://www.dioo.com for a complete list of Dioo product families.

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