

4PST Depletion Mode Isolation Audio Switch

General Description

ET3550 is a high-performance 4PST, normally closed depletion type isolation switch. Depletion technology allows devices to conduct signals in the absence of VCC and isolate signals in the presence of VCC.

ET3550 operates within a wide range of VCC voltage and has the capability to calculate flexibility.

Additionally, in the presence of VCC, selecting pins allows for internal oscillator operation, the frequency is between 500KHz and 750KHz, with a step size of 75KHz make adjustments. This feature is used to transfer dispersed electromagnetic interference (EMI), so as to meet the customer's specification requirements.

ET3550 is offered WLCSP12 or QFN16 package, which is ideal for small form factor portable equipment.

Features

- 4PST (NC)
- Depletion Mode MOSFETs
- Audio Frequency Range
- $V_{CC(OFF)}$ Range from 1.6 V to 3.0 V
- Ultra-Low R_{ON} : 0.5 Ω (Typical)
- Flatness of R_{ON} : 0.01 Ω (Typical)
- Low THD+N: 0.002% Typical
- High Continuous Current Capability: $\pm 350mA$ Through Each Switch
- Device and Package Information:

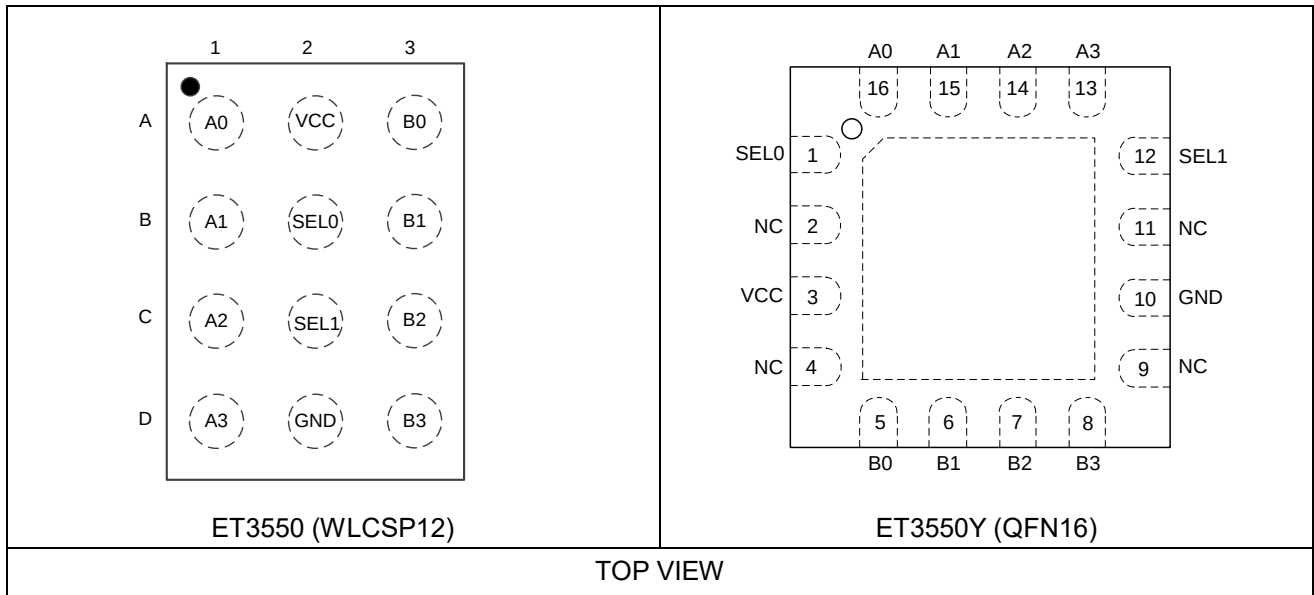
Part No.	Package	Packing Option	MSL
ET3550	WLCSP12 (0.4mm pitch)	Tape and Reel ,5K	1
ET3550Y	QFN16 (3mm×3mm)	Tape and Reel ,5K	3

Application

- Smart Phones
- Audio Block/ Speaker
- Media Tablets

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Pin Configuration



Pin Function

Pin No.		Pin Name	Type	Description
WLCSP12	QFN16			
A1	16	A0	I/O	A port , input or output
B1	15	A1	I/O	A port , input or output
C1	14	A2	I/O	A port , input or output
D1	13	A3	I/O	A port , input or output
A2	3	VCC	Power	Power input
B2	1	SEL0	I	Oscillator frequency control (see Table 2). Used for transferring dispersed electromagnetic interference (EMI) to meet customer specifications.
C2	12	SEL1	I	
D2	10	GND	Power	Ground
A3	5	B0	I/O	B port , input or output
B3	6	B1	I/O	B port , input or output
C3	7	B2	I/O	B port , input or output
D3	8	B3	I/O	B port , input or output
	2,4,9,11	NC		No connect

Note: Unused input/output ports are recommended to be suspended.

Table 1. Truth Table

VCC	Function
0V ~ 0.2V	Connect; Bn = An
1.6V ~ 3.0V	Disconnect; Bn ≠ An

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Table 2. Oscillator Frequency Step Logic

SEL1	SEL0	Frequency (Typical Value)
L	L	500KHz
L	H	575KHz
H	L	650KHz
H	H	725KHz

Absolute Maximum Ratings

Maximum ratings are those values beyond which device damage can occur. Maximum ratings applied to the device are individual stress limit values (not normal operating conditions) and are not valid simultaneously. If these limits are exceeded, device functional operation is not implied, damage may occur and reliability may be affected.

Symbol	Characteristic		Min	Max	Unit
V _{CC}	Supply Voltage		0	5.5	V
V _{IN}	Select Input Voltage (SEL0, SEL1)		0	V _{CC}	V
V _{SW(ON)}	I/O Port Voltage (Switch ON)	V _{CC} = 0V	-5.0	+5.0	V
V _{SW(OFF)} ⁽¹⁾	I/O Port Voltage (Switch Isolated)	V _{CC} = Power on	-1.8	+3.0	V
I _{IK}	DC Input Diode Current		-50		mA
I _{SW}	Switch I/O Current	V _{CC} = 0V		350	mA
I _{SWPEAK}	Maximum Peak Current of Switch (1ms,<10% ON duty cycle)			500	mA
V _{ESD}	HBM			±4.0	KV
T _J	Junction Temperature			+150	°C
T _{STG}	Storage Temperature		-65	+150	°C

Note(1): When the switch is isolated, The V_{SW} value must be less than V_{CC}.

Recommended Operating Conditions

Characteristic		Symbol	Min	Max	Unit
DC Supply Voltage (Switch ON)		V _{CC(ON)}	0	0.2	V
DC Supply Voltage (Switch Isolated)		V _{CC(OFF)}	1.6	3.0	V
I/O Port Voltage (Switch ON)	V _{CC} = 0V	V _{SW(ON)}	-2.0	+2.0	V
I/O Port Voltage (Switch Isolated)	V _{CC} = 1.6V~3.0V	V _{SW(OFF)}	-1.6	+1.6	V
Operating Temperature Range		T _A	-40	+85	°C

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DC Electrical Characteristics

Symbol	Parameter	Test Conditions	V _{CC} ±10%	T _A =-40°C~+85°C			Unit
				Min	Typ	Max	
I _{ON}	Leakage Current (Switch ON)	An = -1.4V~1.4V, Bn = Float	0	0	0.3	2.0	μA
I _{OFF}	Leakage Current (Switch Isolated)	An = 0.4V~1.4V, Bn = Float	3	0	0.5	1	μA
R _{ON}	On-Resistance ⁽²⁾	I _{SW} = ±24mA, V _{SW} = -1.4 V~1.4V	0		0.5		Ω
R _{FLAT(ON)}	On-Resistance Flatness ⁽²⁾	I _{SW} = ±24mA, V _{SW} = -1.4V~1.4V	0		0.01		Ω
I _{CC}	Maximum Quiescent Supply Current ⁽²⁾	SEL0 = V _{CC} SEL1 = V _{CC}	3	0	40	60	μA
V _{IH}	Minimum High-Level Input Voltage, Select Inputs ⁽³⁾		3	0.8* V _{CC}			V
V _{IL}	Maximum Low-Level Input Voltage, Select Inputs ⁽³⁾		3			0.2* V _{CC}	V
I _{IN}	Maximum Input Leakage Current, Select Inputs ⁽³⁾		3	0		±1	μA

Notes :

(2) Ensure through testing and feature assurance;

(3) The voltage on the control pin must be less than V_{CC}.

AC Electrical Characteristics

Symbol	Parameter	Test Conditions	V _{CC} (V)	Typ	Unit
t _{ON}	Turn-On Time V _{CC} to Output ^(4,5)	R _L = 32Ω, C _L = 10pF, V _{SW} = 1.4V	1.6	160	nS
t _{OFF}	Turn-Off Time V _{CC} to Output ^(4,5)	R _L = 32Ω, C _L = 10pF, V _{SW} = 1.4V	1.6	90	μS
O _{IRR}	OFF-Isolation ^(4,5)	R _L = 32 Ω, f = 20KHz, V _{SW} = 0.35V _{RMS}	1.6	-90	dB
		R _L = 32 Ω, f = 20KHz, V _{SW} = 0.707V _{RMS}	1.6	-85	dB
X _{TALK}	Non-Adjacent Channel Crosstalk ^(4,5)	R _L = 32 Ω, f = 20KHz, V _{SW} = 0.707V _{RMS}	0	-85	dB
		R _L = 32 Ω, f = 20KHz, V _{SW} = 1V _{RMS}	0	-85	dB
BW	-3dB Bandwidth ⁽⁵⁾	R _L = 32Ω, C _L = 0pF	0	<200	MHz
THD+N	Total Harmonic Distortion THD +Noise ^(4,5)	R _L = 32Ω, f = 20Hz~20KHz, V _{SW} = 1V _{RMS}	0	0.002	%

Notes :

(4) SEL0 = SEL1 = Low level;

(5) Guaranteed by design.

Typical Characteristics

T_A=25°C, unless otherwise stated

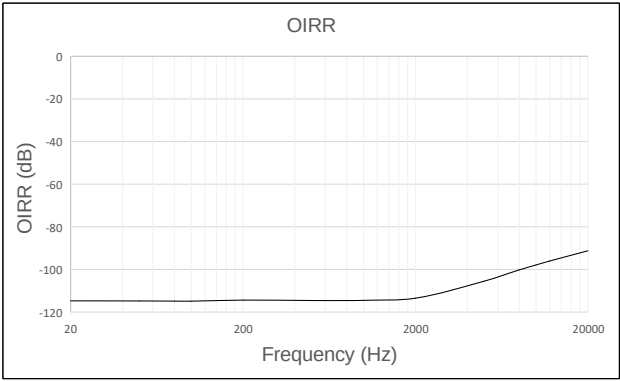


Figure 1. OIRR vs Frequency
(WLCSP12, V_{SW}=0.35V_{RMS}, R_L=32Ω)

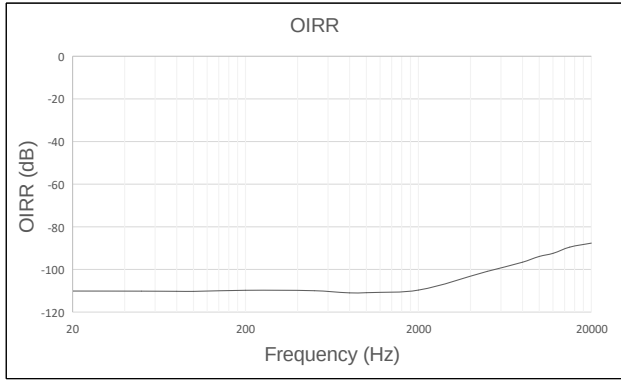


Figure 2. OIRR vs Frequency
(QFN16, V_{SW}=0.35V_{RMS}, R_L=32Ω)

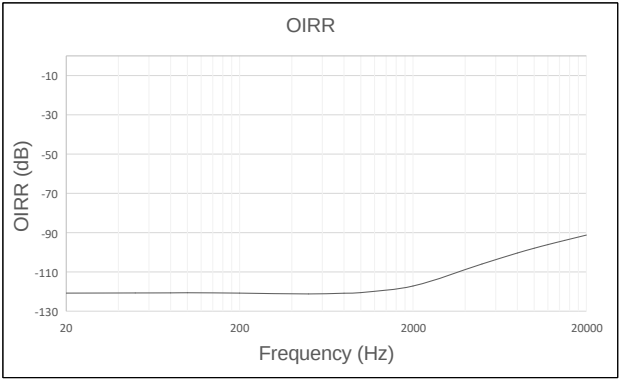


Figure 3. OIRR vs Frequency
(WLCSP12, V_{SW}=0.707V_{RMS}, R_L=32Ω)

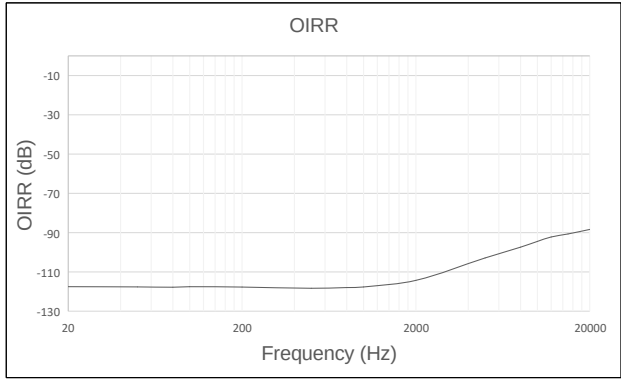


Figure 4. OIRR vs Frequency
(QFN16, V_{SW}=0.707V_{RMS}, R_L=32Ω)

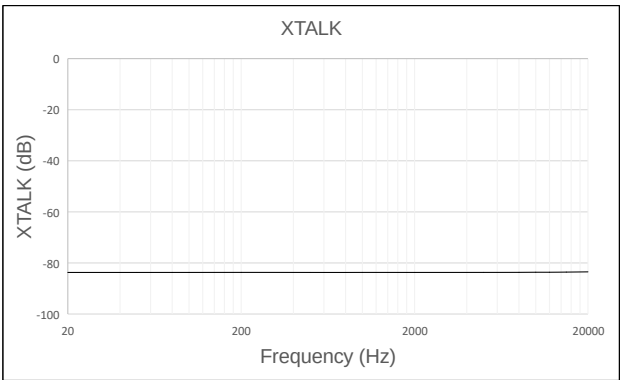


Figure 5. XTALK vs Frequency
(WLCSP12, V_{SW}=0.707V_{RMS}, R_L=32Ω)

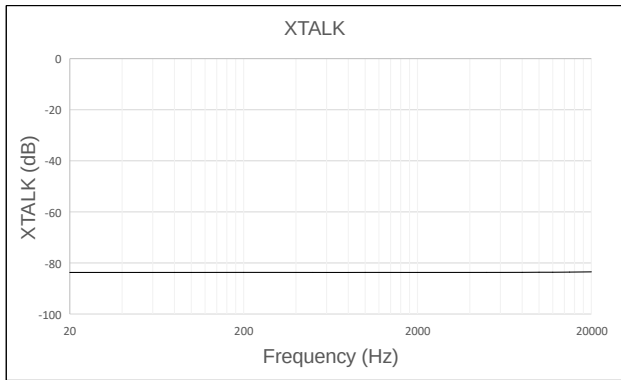


Figure 6. XTALK vs Frequency
(QFN16, V_{SW}=0.707V_{RMS}, R_L=32Ω)

Typical Characteristics(Continued)

$T_A=25^{\circ}\text{C}$, unless otherwise stated

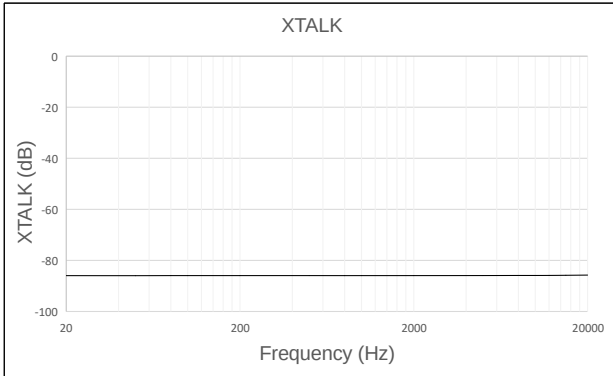


Figure 7. XTALK vs Frequency
(WLCSP12, $V_{SW}=1V_{RMS}$, $R_L=32\Omega$)

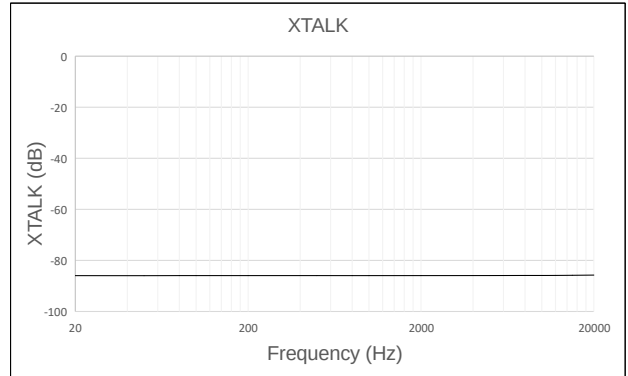


Figure 8. XTALK vs Frequency
(QFN16, $V_{SW}=1V_{RMS}$, $R_L=32\Omega$)

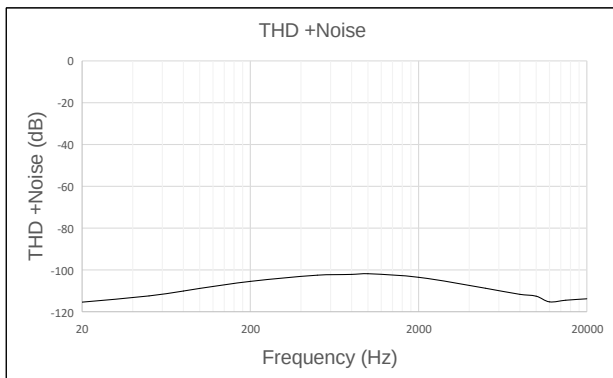


Figure 9. THD+N vs Frequency
(WLCSP12, $V_{SW}=1V_{RMS}$, $R_L=32\Omega$)

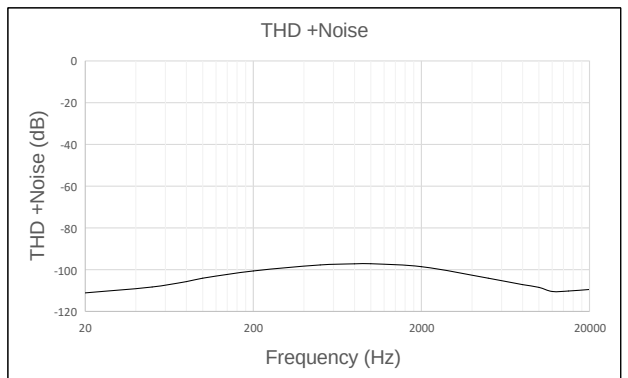


Figure 10. THD+N vs Frequency
(QFN16, $V_{SW}=1V_{RMS}$, $R_L=32\Omega$)

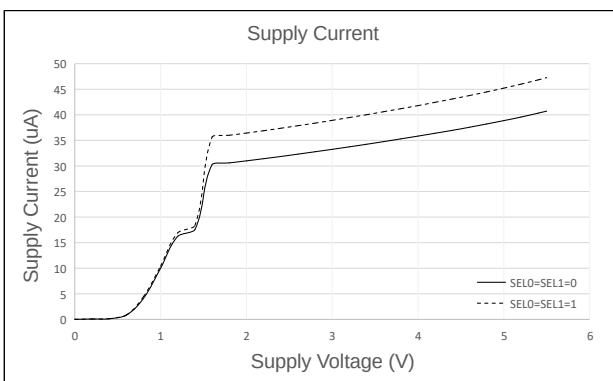
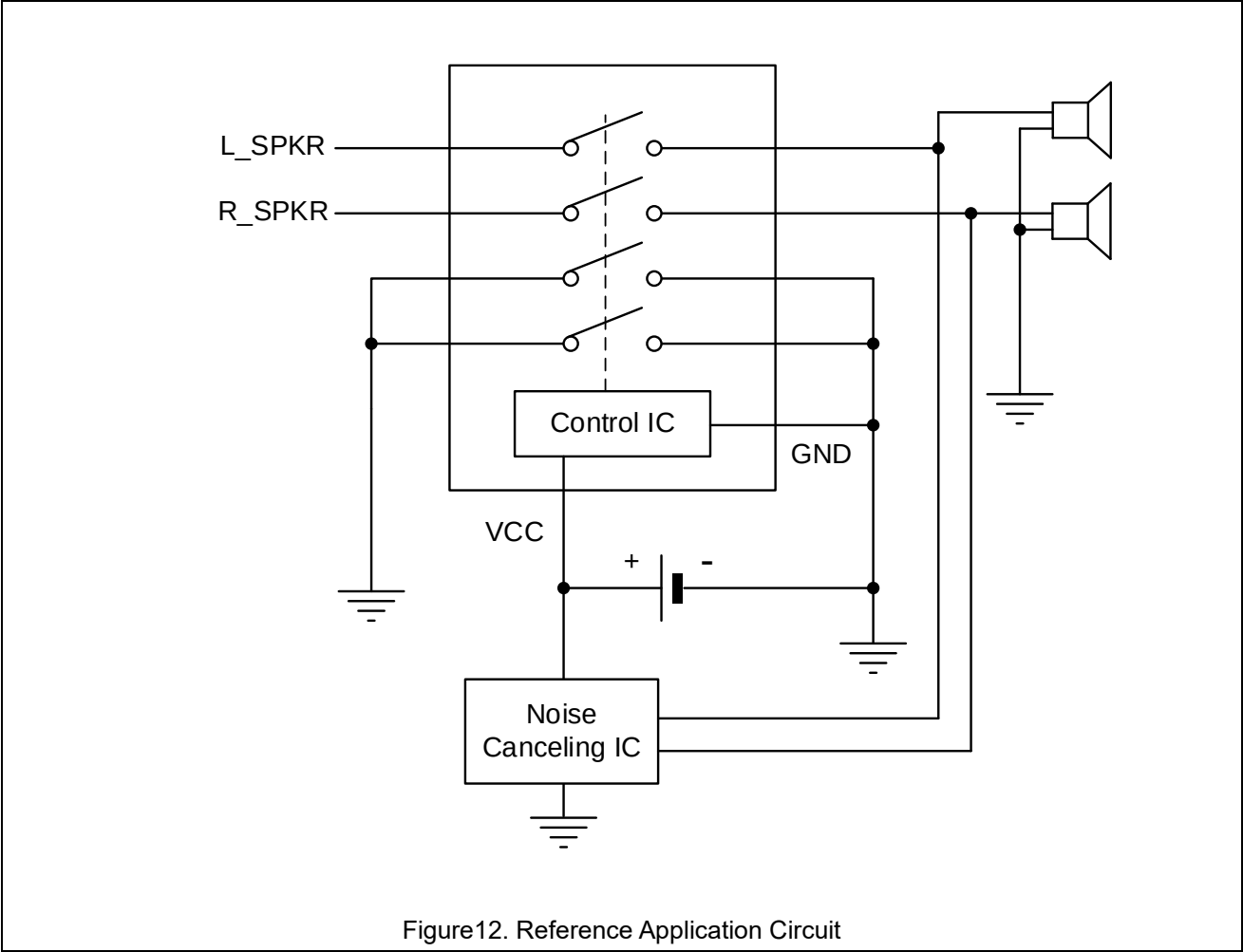


Figure 11. Supply Current vs Supply Voltage

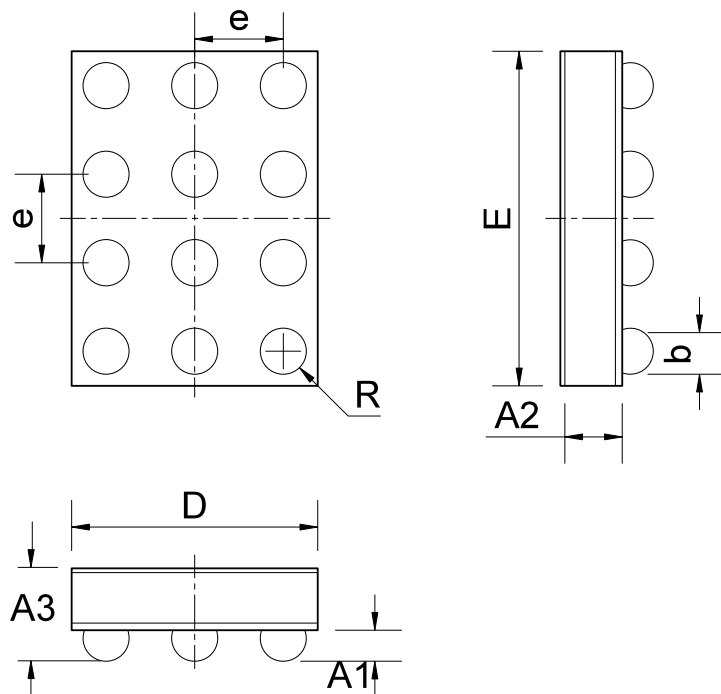
Reference Application Circuit



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Package Dimension

WLCSP12



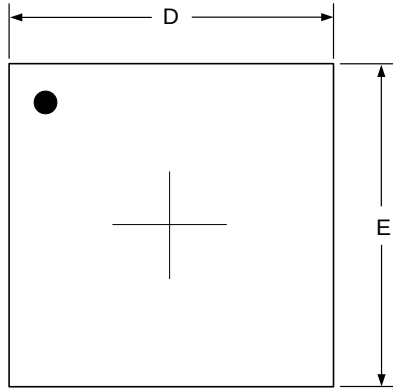
COMMON DIMENSIONS

(Unit : mm)

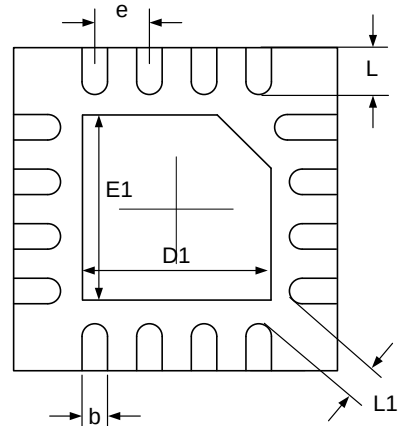
SYMBOL	MIN	NOM	MAX
E	1.54	1.57	1.60
D	1.14	1.17	1.20
e	0.40BSC		
R	0.243	0.268	0.293
A1	0.177	0.202	0.227
A2	0.355	0.380	0.405
A3	0.622MAX		
b	0.243	0.268	0.293

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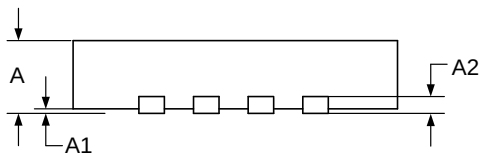
QFN16 (3mm×3mm)



TOP VIEW



BOTTOM VIEW



SIDE VIEW

COMMON DIMENSIONS

(Unit : mm)

SYMBOL	MIN	NOM	MAX
A	0.70	0.75	0.80
A1	0.00	0.02	0.05
A2	0.153	0.203	0.253
b	0.18	0.23	0.30
D	2.91	3.00	3.10
E	2.91	3.00	3.10
e	0.45	0.50	0.55
L	0.30	0.40	0.50
L1	0.40	0.45	0.50
D1	1.60	1.70	1.80
E1	1.60	1.70	1.80

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Revision History and Checking Table

Version	Date	Revision Item	Modifier	Function & Spec Checking	Package & Tape Checking
1.0	2022-01-10	Original Version	Wuxj	Wuxj	Zhuji
1.1	2023-06-29	Update Typeset	Shibo	Liuji	Liuji
1.2	2025-4-25	Update Package dimension	Shibo	Liuji	Liuji
1.3	2025-11-13	Modify some mistakes	Pansy	Liuji	Liuji