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TECHNICAL DATASHEET
Click IT SKU MOD-LLC-4CH-BSS138
REV 1 | 2026-10-22

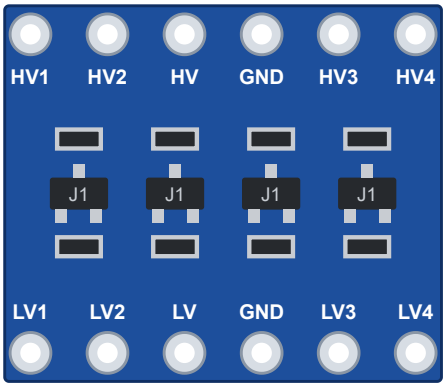
4-Channel Logic Level Converter

Bidirectional MOSFET level shifter for I2C, UART and slow SPI between 3.3 V and 5 V logic

4 CHANNELS | BIDIRECTIONAL | BSS138 (J1) MOSFETS | 10 KΩ PULL-UPS BOTH SIDES | 2.54 MM PITCH

PINOUT, COMPONENT SIDE

HIGH-VOLTAGE SIDE (for example 5 V)



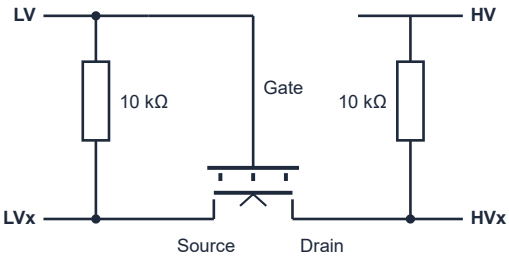
LOW-VOLTAGE SIDE (for example 3.3 V)

Component side, labels upright. Simplified, not to scale.

PIN	FUNCTION	CONNECT TO
HV	High-side reference	Higher supply, such as 5 V
LV	Low-side reference	Lower supply, such as 3.3 V
GND	Ground, one per row	Ground of both boards
HV1 to HV4	Channel signals, high side	Signal pins on the HV board
LV1 to LV4	Channel signals, low side	Signal pins on the LV board

HV1 pairs with LV1, HV2 with LV2, and so on. Every channel works in both directions, so either side can drive it.

ONE CHANNEL (X4)



N-channel MOSFET, marked J1 (BSS138 type)

Gate on LV, source on the LV side, drain on the HV side. Simplified schematic.

- **Idle (high):** both pull-ups hold LVx at LV and HVx at HV, and the MOSFET is off.
- **LV side pulls low:** the MOSFET turns on and pulls HVx low too.
- **HV side pulls low:** the MOSFET body diode pulls LVx down until the MOSFET turns on and finishes the job.
- **Highs come from the 10 kΩ pull-ups,** not from a driver, so rising edges are slower than falling edges.

RECOMMENDED OPERATING CONDITIONS (NZN)

PARAMETER	CONDITION	MIN	TYP	MAX	UNIT
LV reference voltage	Must be at or below HV	**1.8**	**3.3**	**3.6**	V
HV reference voltage	Must be at or above LV	**3.3**	**5.0**	**5.5**	V
Pull-up resistance, every signal pin	Both sides, marked 103		**10**		kΩ
Current per channel while held low	LV 3.3 V, HV 5 V (I = V / 10 kΩ per side)		**0.83**		mA

LV needs at least about 1.8 V to switch the MOSFETs on. The HV limit is NZN's advice for 3.3 V to 5 V systems, not the transistor rating.

SIGNAL AND SPEED GUIDE Click IT

SIGNAL TYPE	SUITABLE?	NOTES
I2C (SDA, SCL)	**Yes**	100 kHz is reliable. 400 kHz works on short wires with extra bus pull-ups.
UART serial (TX, RX)	**Yes**	Up to 115200 baud. TX and RX each take one channel.
SPI (SCK, MOSI, MISO, CS)	**Slow only**	Keep the clock to about 1 MHz. Fast TFT and SD card SPI needs a buffer-type shifter.
1-Wire, buttons, digital inputs	**Yes**	Open-drain buses and slow logic signals work well.
WS2812 LED data, fast PWM, audio clocks	No	Pull-up edges are too slow and rounded.
Loads: relays, motors, LEDs	No	A high output can supply only about 0.5 mA through its 10 kΩ pull-up.
Analogue voltages	No	Logic levels only.

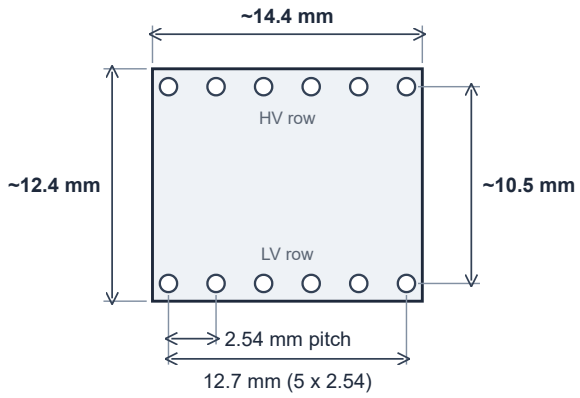
Rising edge (10 to 90 %) ≈ 2.2 x R x C. With the 10 kΩ pull-up and 50 pF of wiring and inputs, that is about 1.1 µs.

CHANNEL MOSFET, MARKED J1 (BSS138 TYPE), PER TRANSISTOR

PARAMETER	CONDITION	MIN	TYP	MAX	UNIT
Drain-source voltage, absolute maximum	T_A = 25 °C			**50**	V
Gate-source voltage, absolute maximum	Continuous	**-20**		**20**	V
Drain current, continuous, absolute maximum	T_A = 25 °C			**200**	mA
Gate threshold voltage	V_{DS} = V_{GS}, I_D = 1 mA	**0.85**		**1.5**	V
On-resistance	V_{GS} = 2.75 V, I_D < 200 mA, -40 to 85 °C		**5.6**	**10**	Ω
On-resistance	V_{GS} = 5 V, I_D = 200 mA			**3.5**	Ω
Input capacitance	V_{DS} = 25 V, f = 1 MHz		**40**	**50**	pF
Power dissipation, absolute maximum	T_A = 25 °C			**225**	mW
Junction temperature, absolute maximum		**-55**		**150**	°C

Component data for the fitted SOT-23 transistor, not a rating for the assembled board. On the board each channel carries only pull-up current, well under 1 mA.

MECHANICAL OUTLINE



Component side, holes shown as circles. ~ = approximate, scaled from stock photos.

FEATURE	VALUE	UNIT
Board width x height	**~14.4 x ~12.4**	mm
Holes per row, pitch	**6 x 2.54**	mm
First to last hole in a row	**12.7**	mm
Row centre to row centre	**~10.5**	mm
Mounting holes	**None**	
Supplied headers, loose	**2 x 6-pin, 2.54**	mm

WIRING: 5 V UNO TO 3.3 V I2C SENSOR

CONVERTER	UNO SIDE (HV)	SENSOR SIDE (LV)
HV	Uno 5V	
LV		Uno 3.3V (also powers the sensor)
GND	Uno GND	Sensor GND
HV1 / LV1	A4 (SDA)	Sensor SDA
HV2 / LV2	A5 (SCL)	Sensor SCL

- **Both references must be powered.** With HV or LV unconnected the channels do not switch.
- **LV below HV.** Swapping them gives no conversion and can push the higher voltage into the 3.3 V board.
- **Pull-ups:** the board already has 10 kΩ on every pin, so I2C needs no extra resistors. Leave any on the sensor board in place.
- **Unused channels** can be left unconnected.
- **Fitting headers:** solder the straight headers pins-down to use the board on a breadboard or with female jumper wires.

REVISION HISTORY

REV	DATE	CHANGE
1	2026-10-22	First release