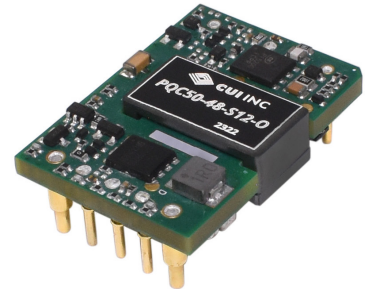


SERIES: PQC50-0 | **DESCRIPTION:** DC-DC CONVERTER

FEATURES

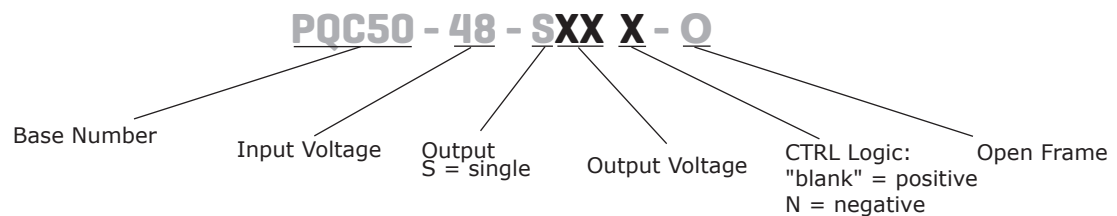
- 50 W isolated output
- industry standard DOSA 1/16 brick
- 2:1 input range (36~75 Vdc)
- -40 ~ 85°C operating temperature
- over-current, input under-voltage, over-voltage and output short-circuit protection
- remote on/off control
- EN/BS EN 62368 certified



| MODEL | input voltage | | output voltage (Vdc) | output current | | output power max (W) | ripple and noise ¹ max (mVp-p) | efficiency ² typ (%) |
|----------------|---------------|-------------|-------------------------|----------------|----------|-------------------------|--|------------------------------------|
| | typ (Vdc) | range (Vdc) | | min (mA) | max (mA) | | | |
| PQC50-48-S5-O | 48 | 36~75 | 5 | 0 | 10,000 | 50 | 200 | 88 |
| PQC50-48-S12-O | 48 | 36~75 | 12 | 0 | 4,170 | 50 | 200 | 90 |

Notes: 1. Ripple and noise are measured at 20 MHz BW, 5%~100% load by "parallel cable" method with 1 μF ceramic and 10 μF electrolytic capacitors on the output.
2. Efficiency is measured at nominal input voltage and rated output load.

PART NUMBER KEY



INPUT

| parameter | conditions/description | min | typ | max | units |
|-----------------------------|---|--|---------|----------|-------|
| operating input voltage | | 36 | 48 | 80 | Vdc |
| current (full load/no load) | at nominal input voltage | | 1,185/6 | 1,220/20 | mA |
| reflected ripple current | at nominal input voltage | | 50 | | mA |
| start-up voltage | | | | 36 | Vdc |
| under-voltage protection | | 26 | 29 | | Vdc |
| start-up time | at nominal input voltage & constant resistance load | | | 100 | ms |
| surge voltage | for maximum of 1 second | -0.7 | | 100 | Vdc |
| CTRL ³ | positive logic | module ON: CTRL pin open or pulled high (4.5~12Vdc) | | | |
| | | module OFF: CTRL pin pulled low to GND (0~1.2Vdc) | | | |
| | negative logic | module ON: CTRL pin pulled low to GND (0~1.2Vdc) | | | |
| | | module OFF: CTRL pin open or pulled high (4.5~12Vdc) | | | |
| standby current | CTRL pin pulled low | | 6 | 10 | mA |
| filter | C filter | | | | |

Notes: 3. The CTRL pin voltage is referenced to input GND.

OUTPUT

| parameter | conditions/description | min | typ | max | units |
|----------------------------------|---|-----|------|-------|-------|
| maximum capacitive load | 5 Vdc output | | | 7,200 | μF |
| | 12 Vdc output | | | 2,000 | μF |
| line regulation ⁴ | full load, input voltage from low to high | | ±0.2 | ±0.5 | % |
| load regulation | 5% to 100% load | | ±0.5 | ±1 | % |
| voltage accuracy | 5% to 100% load | | ±1 | ±3 | % |
| switching frequency ⁵ | PWM mode | | 230 | | kHz |
| transient recovery time | 25% load step change, nominal input | | 300 | 500 | μs |
| transient response deviation | 25% load step change, nominal input | | | | |
| | 5 Vdc output voltage | | ±5 | ±10 | % |
| | 12 Vdc output voltage | | ±3 | ±5 | % |
| temperature coefficient | full load | | | ±0.03 | %/°C |
| trim | | 90 | | 110 | % |
| remote sense compensation | | | | 105 | % |

Notes: 4. Line regulation for 0%~100% load is ±3%.

5. Switching frequency is measured at full load. The module reduces the switching frequency for light load (below 50%) efficiency improvement.

PROTECTIONS

| parameter | conditions/description | min | typ | max | units |
|--------------------------|---------------------------|-----|-----|-----|-------|
| over voltage protection | | 110 | 130 | 160 | % |
| over current protection | | 110 | 150 | 190 | % |
| short circuit protection | auto recovery, continuous | | | | |

SAFETY AND COMPLIANCE

| parameter | conditions/description | min | typ | max | units |
|-----------------------|---|-------|-------|-----|-------|
| isolation voltage | input to output for 1 minute at 1 mA max. | 1,500 | | | Vdc |
| isolation resistance | input to output at 500 Vdc | 1,000 | | | MΩ |
| isolation capacitance | input to output at 100kHz/0.1V | | 1,000 | | pF |
| vibration | 10-150Hz, 5G, 0.75mm. along X, Y and Z | | | | |

SAFETY AND COMPLIANCE (CONTINUED)

| parameter | conditions/description | min | typ | max | units |
|---------------------|--|-----------|-----|-----|-------|
| safety approvals | certified 62368: EN, BS EN | | | | |
| conducted emissions | CISPR32/EN55032 CLASS A (see Fig. 2 for recommended circuit) CISPR32/EN55032 CLASS B (see Fig. 3-1 for recommended circuit) | | | | |
| radiated emissions | CISPR32/EN55032 CLASS A (see Fig. 2 for recommended circuit) CISPR32/EN55032 CLASS B (see Fig. 3-1 for recommended circuit) | | | | |
| ESD | IEC/EN61000-4-2 Contact ±4KV, perf. Criteria B | | | | |
| radiated immunity | IEC/EN61000-4-3 10V/m, perf. Criteria A | | | | |
| EFT/burst | IEC/EN61000-4-4 ±2KV (see Fig.2-1 for recommended circuit), perf. Criteria B | | | | |
| surge | IEC/EN61000-4-5 line to line ±2KV (see Fig.2-2 for recommended circuit), perf. Criteria B | | | | |
| conducted immunity | IEC/EN61000-4-6 3 Vrms, perf. Criteria A | | | | |
| MTBF | as per MIL-HDBK-217F at 25°C | 1,000,000 | | | hours |
| RoHS | yes | | | | |

ENVIRONMENTAL

| parameter | conditions/description | min | typ | max | units |
|-----------------------|------------------------|-----|-----|-----|-------|
| operating temperature | see derating curve | -40 | | 85 | °C |
| storage temperature | | -55 | | 125 | °C |
| storage humidity | non-condensing | 5 | | 95 | % |

MECHANICAL

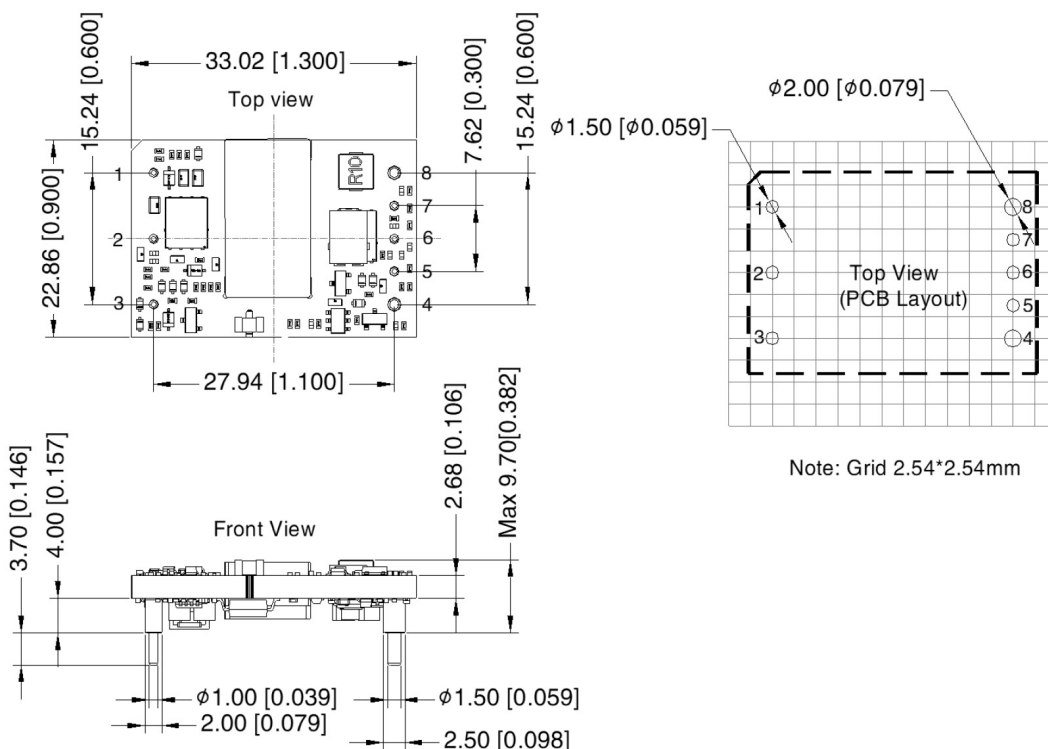
| parameter | conditions/description | min | typ | max | units |
|----------------|---|-----|-----|-----|-------|
| dimensions | 33.02 x 22.86 x 9.70 [1.300 x 0.900 x 0.382 inch] | | | | mm |
| weight | | | 12 | | g |
| cooling method | natural convection or forced air | | | | |

MECHANICAL DRAWING

units: mm[inch]
 tolerance: ±0.50[±0.020]
 pin section tolerance: ±0.10[±0.004]
 pin 1,2,3,5,6,7: Ø1.0mm
 pin 4,8: Ø1.5mm

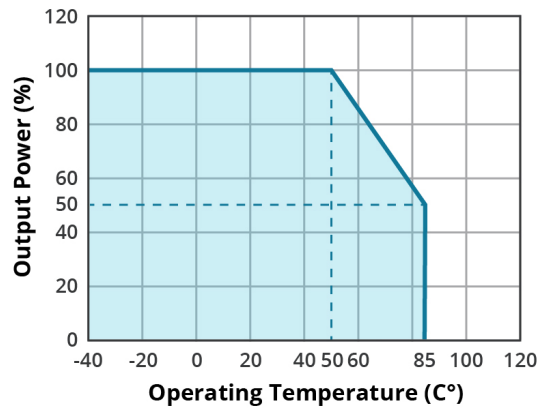
Note: The layout of the device is for reference only, please refer to the actual product.

| PIN CONNECTIONS | |
|-----------------|----------|
| PIN | Function |
| 1 | Vin |
| 2 | CTRL |
| 3 | GND |
| 4 | 0V |
| 5 | Sense- |
| 6 | Trim |
| 7 | Sense+ |
| 8 | +Vo |



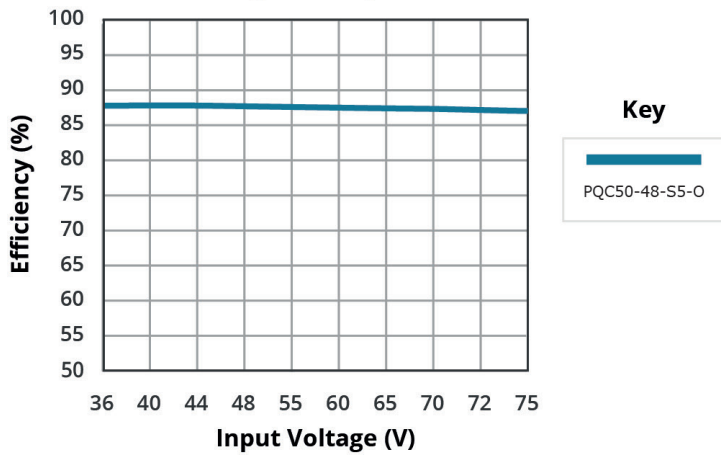
DERATING CURVE

TEMPERATURE DERATING CURVE

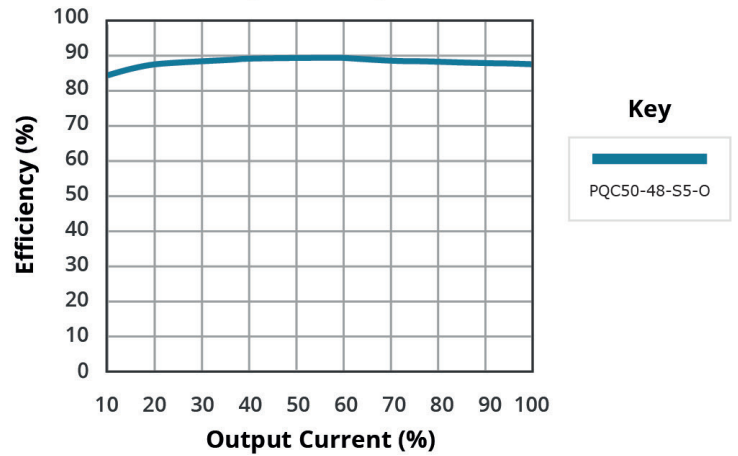


EFFICIENCY CURVES

**EFFICIENCY VS INPUT VOLTAGE
(full load)**



**EFFICIENCY VS OUTPUT LOAD
(Vin = 48V)**



APPLICATION NOTES

All DC-DC converters of this series are tested before delivery using the recommended circuit shown in Fig. 1. Input and/or output ripple can be further reduced by appropriately increasing the input & output capacitor values C_{in} and C_{out} and/or by selecting capacitors with a low ESR (equivalent series resistance). Also make sure that the capacitance is not exceeding the specified max. capacitive load value of the product.

Figure 1

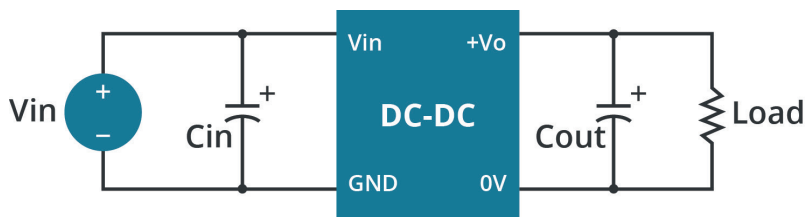
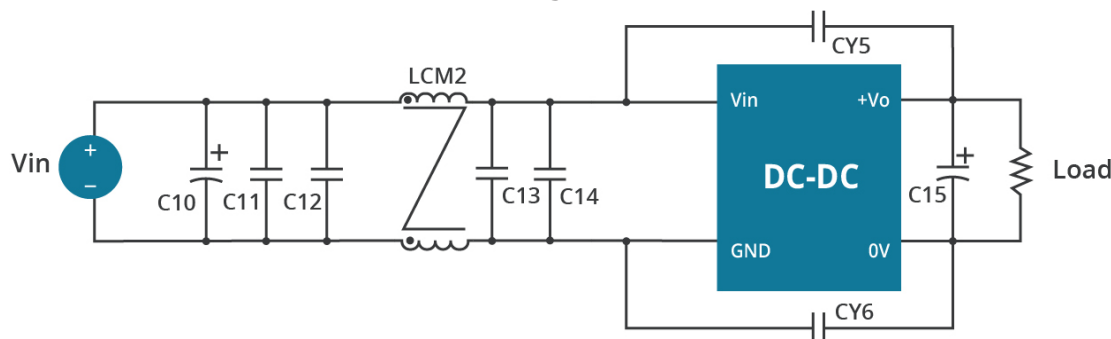


Table 1

| Vin (Vdc) | Cin (μF/V) | Cout (μF/V) |
|-----------|------------|-------------|
| 48 | 100μF/100V | 330μF/63V |

EMC CLASS A RECOMMENDED CIRCUIT

Figure 2



Notes: For EMC tests we use Part 2 in Fig. 2 for immunity and part 1 for emissions test. Selecting based on needs.

Table 2

| | |
|--------------------|-----------------------------|
| Vout | 5V, 12V |
| C10 | 680μF/100V |
| C11, C12, C13, C14 | 4.7μF/100V |
| C15 | refer to the Cout in Fig. 1 |
| LCM2 | 2.2 mH |
| CY5, CY6 | 2.2nF/400Vac |

EMC CLASS B RECOMMENDED CIRCUIT

Figure 3

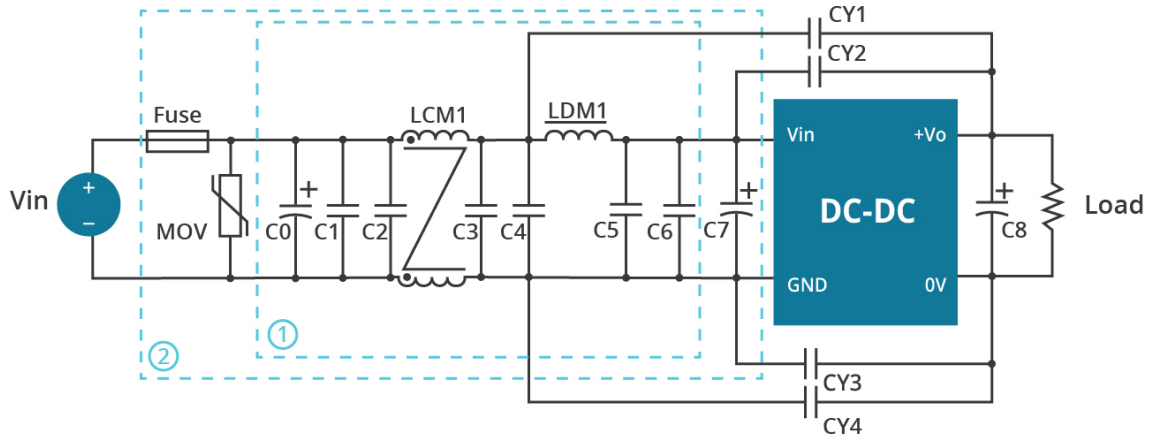
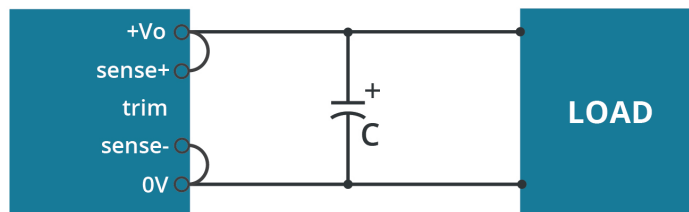


Table 3

| Recommended external circuit components | |
|---|--|
| Vout | 28V |
| FUSE | according to the customer's actual input current selection |
| MOV | 14D101K |
| C0 | 680μF/100V |
| C1/C2/C3/C4/C5/C6 | 4.7μF/100V |
| C7 | 330μF/100V |
| C8 | refer to the Cout in Fig. 1 |
| LCM1 | 2.2mH |
| LDM1 | 22μH |
| CY1/CY2/CY3/CY4 | 2.2nF/400Vac |

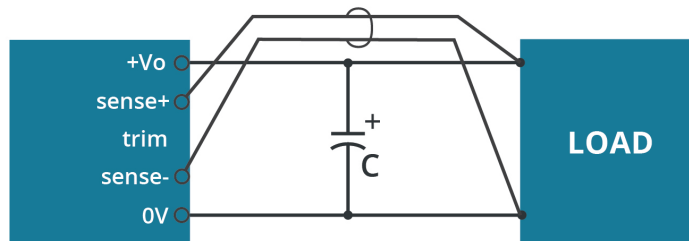
REMOTE SENSE APPLICATION

Figure 4
REMOTE SENSE CONNECTION
IF NOT USED



- Note:
1. Lines must be kept as short as possible.
 2. If the sense function is not used for remote regulation the user must connect the +Sense to + Vo and -Sense to 0V at the DC-DC converter pins and will compensate for voltage drop across pins only.
 3. The connections between Sense lines and their respective power lines must be kept as short as possible, otherwise they may be picking up noise, interference and/or causing unstable operation of the power module.

Figure 5
REMOTE SENSE CONNECTION
USED FOR COMPENSATION

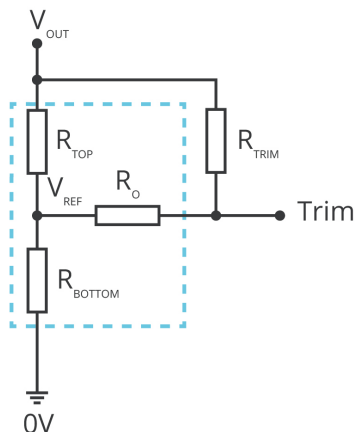


- Note:
1. In cables and discrete wiring applications, twisted pair or other techniques should be implemented.
 2. Using remote sense with long wires may cause unstable output, please contact technical support if long wires must be used.
 3. PCB-tracks or cables/wires for Remote Sense must be kept as short as possible. Twisted pair or shielded wires are suggested for remote compensation and must be kept as short as possible.
 4. We recommend using adequate cross section for PCB-track layout and/or cables to connect the power supply module to the load in order to keep the voltage drop below 0.3V and to make sure the power supply's output voltage remains within the specified range.
 5. Note that large wire impedance may cause oscillation of the output voltage and/or increased ripple. Consult technical support or factory for further advice of sense operation.

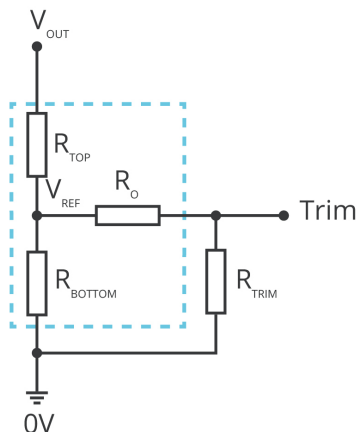
APPLICATION NOTES

Figure 6

Trim up



Trim down



$$R_{TRIM} = \left(\frac{5.11 \cdot V_{NOM} (100 + \Delta\%)}{1.225 \Delta\%} - \frac{511}{\Delta\%} - 10.22 \right) (K\Omega)$$

Formula for Trim up

$$R_{TRIM} = \left(\frac{511}{\Delta\%} \right) - 10.22 (K\Omega)$$

Formula for Trim down

Note: R_{TRIM} : Trim resistance

$$\Delta\%: \Delta\% = \left| \frac{V_{NOM} - V_{OUT}}{V_{NOM}} \right| \times 100$$

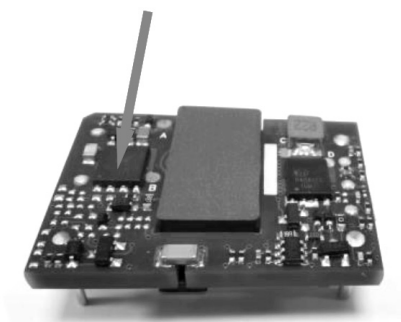
V_{NOM} : Nominal output voltage

V_{OUT} : Target output voltage

THERMAL TEST POINT

The thermal element is installed on the top surface of the product and dissipates heat to the surrounding environment through conduction, convection and radiation. Sufficient heat dissipation conditions should be provided to ensure the reliable operation of the product. By measuring the temperature of the thermal test point in Fig. 7, it can be verified whether the heat dissipation conditions are met.

Figure 7



- Note:
1. Maximum capacitive load is tested at input voltage range and full load.
 2. All specifications are measured at $T_a=25^\circ\text{C}$, humidity<75%, nominal input voltage and rated output load unless otherwise specified.

REVISION HISTORY

| rev. | description | date |
|------|-----------------------|------------|
| 1.0 | initial release | 07/10/2023 |
| 1.01 | product image updated | 07/26/2023 |

The revision history provided is for informational purposes only and is believed to be accurate.



CUI INC

a bel group

Headquarters

20050 SW 112th Ave.
Tualatin, OR 97062
800.275.4899

Fax 503.612.2383
cui.com
techsupport@cui.com

CUI offers a two (2) year limited warranty. Complete warranty information is listed on our website.

CUI reserves the right to make changes to the product at any time without notice. Information provided by CUI is believed to be accurate and reliable. However, no responsibility is assumed by CUI for its use, nor for any infringements of patents or other rights of third parties which may result from its use.

CUI products are not authorized or warranted for use as critical components in equipment that requires an extremely high level of reliability. A critical component is any component of a life support device or system whose failure to perform can be reasonably expected to cause the failure of the life support device or system, or to affect its safety or effectiveness.