



## FQD1N60C / FQU1N60C

### 600V N-Channel MOSFET

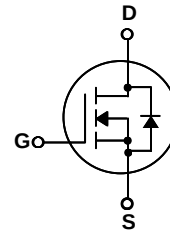
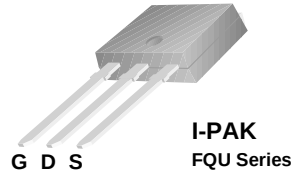
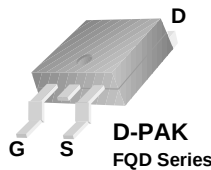
#### General Description

These N-Channel enhancement mode power field effect transistors are produced using Corise Semiconductor's proprietary, planar stripe, DMOS technology.

This advanced technology has been especially tailored to minimize on-state resistance, provide superior switching performance, and withstand high energy pulse in the avalanche and commutation mode. These devices are well suited for high efficiency switch mode power supply.

#### Features

- 1A, 600V,  $R_{DS(on)} = 11.5\Omega$  @  $V_{GS} = 10V$
- Low gate charge ( typical 4.8nC)
- Low  $C_{rss}$  ( typical 3.5 pF)
- Fast switching
- 100% avalanche tested
- Improved dv/dt capability



#### Absolute Maximum Ratings

$T_C = 25^\circ\text{C}$  unless otherwise noted

| Symbol         | Parameter                                                                     | FQD1N60C / FQU1N60C | Units               |
|----------------|-------------------------------------------------------------------------------|---------------------|---------------------|
| $V_{DSS}$      | Drain-Source Voltage                                                          | 600                 | V                   |
| $I_D$          | Drain Current - Continuous ( $T_C = 25^\circ\text{C}$ )                       | 1                   | A                   |
|                | - Continuous ( $T_C = 100^\circ\text{C}$ )                                    | 0.6                 | A                   |
| $I_{DM}$       | Drain Current - Pulsed (Note 1)                                               | 4                   | A                   |
| $V_{GSS}$      | Gate-Source Voltage                                                           | $\pm 30$            | V                   |
| $E_{AS}$       | Single Pulsed Avalanche Energy (Note 2)                                       | 33                  | mJ                  |
| $I_{AR}$       | Avalanche Current (Note 1)                                                    | 1                   | A                   |
| $E_{AR}$       | Repetitive Avalanche Energy (Note 1)                                          | 2.8                 | mJ                  |
| dv/dt          | Peak Diode Recovery dv/dt (Note 3)                                            | 4.5                 | V/ns                |
| $P_D$          | Power Dissipation ( $T_A = 25^\circ\text{C}$ )*                               | 2.5                 | W                   |
|                | Power Dissipation ( $T_C = 25^\circ\text{C}$ )                                | 28                  | W                   |
|                | - Derate above $25^\circ\text{C}$                                             | 0.22                | W/ $^\circ\text{C}$ |
| $T_J, T_{STG}$ | Operating and Storage Temperature Range                                       | -55 to +150         | $^\circ\text{C}$    |
| $T_L$          | Maximum lead temperature for soldering purposes, 1/8" from case for 5 seconds | 300                 | $^\circ\text{C}$    |

#### Thermal Characteristics

| Symbol          | Parameter                                | Typ | Max  | Units              |
|-----------------|------------------------------------------|-----|------|--------------------|
| $R_{\theta JC}$ | Thermal Resistance, Junction-to-Case     | --  | 4.53 | $^\circ\text{C/W}$ |
| $R_{\theta JA}$ | Thermal Resistance, Junction-to-Ambient* | --  | 50   | $^\circ\text{C/W}$ |
| $R_{\theta JA}$ | Thermal Resistance, Junction-to-Ambient  | --  | 110  | $^\circ\text{C/W}$ |

| Symbol | Parameter | Test Conditions | Min | Typ | Max | Units |
|--------|-----------|-----------------|-----|-----|-----|-------|
|--------|-----------|-----------------|-----|-----|-----|-------|

### Off Characteristics

|                                |                                           |                                                     |     |     |      |               |
|--------------------------------|-------------------------------------------|-----------------------------------------------------|-----|-----|------|---------------|
| $BV_{DSS}$                     | Drain-Source Breakdown Voltage            | $V_{GS} = 0\text{ V}, I_D = 250\text{ }\mu\text{A}$ | 600 | --  | --   | V             |
| $\Delta BV_{DSS} / \Delta T_J$ | Breakdown Voltage Temperature Coefficient | $I_D = 250\text{ }\mu\text{A}$ , Referenced to 25°C | --  | 0.6 | --   | V/°C          |
| $I_{DSS}$                      | Zero Gate Voltage Drain Current           | $V_{DS} = 600\text{ V}, V_{GS} = 0\text{ V}$        | --  | --  | 1    | $\mu\text{A}$ |
|                                |                                           | $V_{DS} = 480\text{ V}, T_C = 125^\circ\text{C}$    | --  | --  | 10   | $\mu\text{A}$ |
| $I_{GSSF}$                     | Gate-Body Leakage Current, Forward        | $V_{GS} = 30\text{ V}, V_{DS} = 0\text{ V}$         | --  | --  | 100  | nA            |
| $I_{GSSR}$                     | Gate-Body Leakage Current, Reverse        | $V_{GS} = -30\text{ V}, V_{DS} = 0\text{ V}$        | --  | --  | -100 | nA            |

### On Characteristics

|              |                                   |                                                     |     |      |      |          |
|--------------|-----------------------------------|-----------------------------------------------------|-----|------|------|----------|
| $V_{GS(th)}$ | Gate Threshold Voltage            | $V_{DS} = V_{GS}, I_D = 250\text{ }\mu\text{A}$     | 2.0 | --   | 4.0  | V        |
| $R_{DS(on)}$ | Static Drain-Source On-Resistance | $V_{GS} = 10\text{ V}, I_D = 0.5\text{ A}$          | --  | 9.3  | 11.5 | $\Omega$ |
| $g_{FS}$     | Forward Transconductance          | $V_{DS} = 40\text{ V}, I_D = 0.5\text{ A}$ (Note 4) | --  | 0.75 | --   | S        |

### Dynamic Characteristics

|           |                              |                                                                      |    |     |     |    |
|-----------|------------------------------|----------------------------------------------------------------------|----|-----|-----|----|
| $C_{iss}$ | Input Capacitance            | $V_{DS} = 25\text{ V}, V_{GS} = 0\text{ V},$<br>$f = 1.0\text{ MHz}$ | -- | 130 | 170 | pF |
| $C_{oss}$ | Output Capacitance           |                                                                      | -- | 19  | 25  | pF |
| $C_{rss}$ | Reverse Transfer Capacitance |                                                                      | -- | 3.5 | 4.5 | pF |

### Switching Characteristics

|              |                     |                                                                                             |    |     |     |    |
|--------------|---------------------|---------------------------------------------------------------------------------------------|----|-----|-----|----|
| $t_{d(on)}$  | Turn-On Delay Time  | $V_{DD} = 300\text{ V}, I_D = 1.1\text{ A},$<br>$R_G = 25\text{ }\Omega$<br><br>(Note 4, 5) | -- | 7   | 24  | ns |
| $t_r$        | Turn-On Rise Time   |                                                                                             | -- | 21  | 52  | ns |
| $t_{d(off)}$ | Turn-Off Delay Time |                                                                                             | -- | 13  | 36  | ns |
| $t_f$        | Turn-Off Fall Time  |                                                                                             | -- | 27  | 64  | ns |
| $Q_g$        | Total Gate Charge   | $V_{DS} = 480\text{ V}, I_D = 1.1\text{ A},$<br>$V_{GS} = 10\text{ V}$<br><br>(Note 4, 5)   | -- | 4.8 | 6.2 | nC |
| $Q_{gs}$     | Gate-Source Charge  |                                                                                             | -- | 0.7 | --  | nC |
| $Q_{gd}$     | Gate-Drain Charge   |                                                                                             | -- | 2.7 | --  | nC |

### Drain-Source Diode Characteristics and Maximum Ratings

|                 |                                                       |                                                |    |      |     |    |
|-----------------|-------------------------------------------------------|------------------------------------------------|----|------|-----|----|
| I <sub>S</sub>  | Maximum Continuous Drain-Source Diode Forward Current |                                                | -- | --   | 1   | A  |
| I <sub>SM</sub> | Maximum Pulsed Drain-Source Diode Forward Current     |                                                | -- | --   | 4   | A  |
| V <sub>SD</sub> | Drain-Source Diode Forward Voltage                    | V <sub>GS</sub> = 0 V, I <sub>S</sub> = 0.5 A  | -- | --   | 1.4 | V  |
| t <sub>rr</sub> | Reverse Recovery Time                                 | V <sub>GS</sub> = 0 V, I <sub>S</sub> = 1.1 A, | -- | 190  | --  | ns |
| Q <sub>rr</sub> | Reverse Recovery Charge                               | dI <sub>F</sub> / dt = 100 A/μs (Note 4)       | -- | 0.53 | --  | μC |

#### Notes:

1. Repetitive Rating ; Pulse width limited by maximum junction temperature
2.  $L = 59\text{ mH}$ ,  $I_{AS} = 1.1\text{ A}$ ,  $V_{DD} = 50\text{ V}$ ,  $R_G = 25\text{ }\Omega$ , Starting  $T_J = 25^\circ\text{C}$
3.  $I_{SD} \leq 1.1\text{ A}$ ,  $dI/dt \leq 200\text{ A}/\mu\text{s}$ ,  $V_{DD} \leq BV_{DSS}$ , Starting  $T_J = 25^\circ\text{C}$
4. Pulse Test : Pulse width  $\leq 300\mu\text{s}$ , Duty cycle  $\leq 2\%$
5. Essentially independent of operating temperature

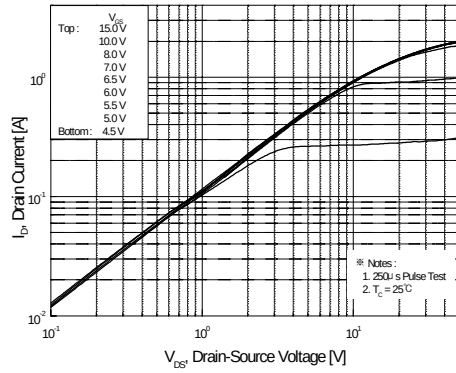


Figure 1. On-Region Characteristics

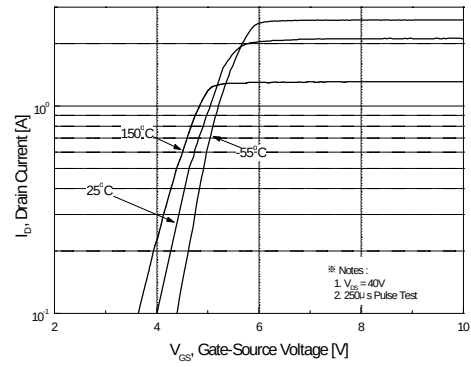


Figure 2. Transfer Characteristics

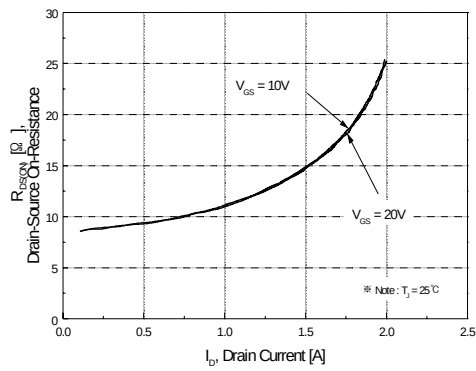


Figure 3. On-Resistance Variation vs Drain Current and Gate Voltage

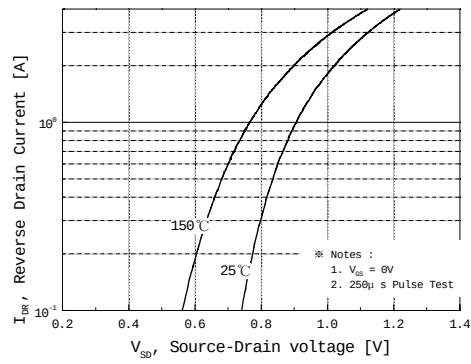


Figure 4. Body Diode Forward Voltage Variation with Source Current and Temperature

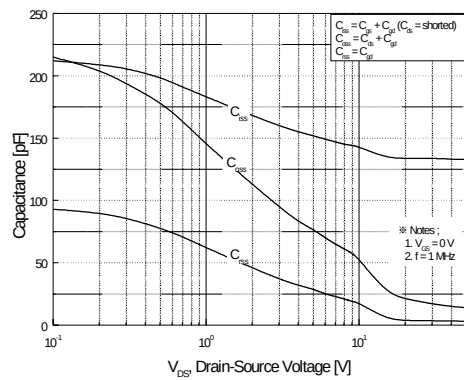


Figure 5. Capacitance Characteristics

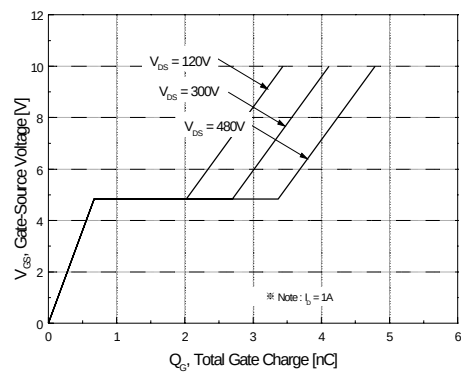


Figure 6. Gate Charge Characteristics

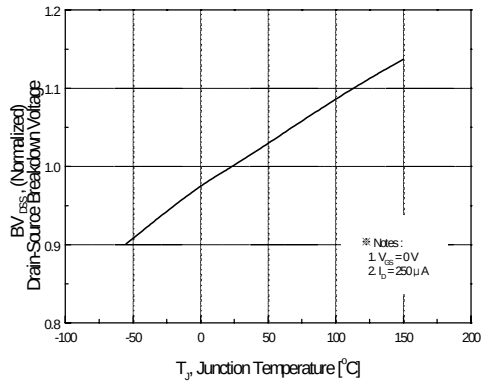


Figure 7. Breakdown Voltage Variation vs Temperature

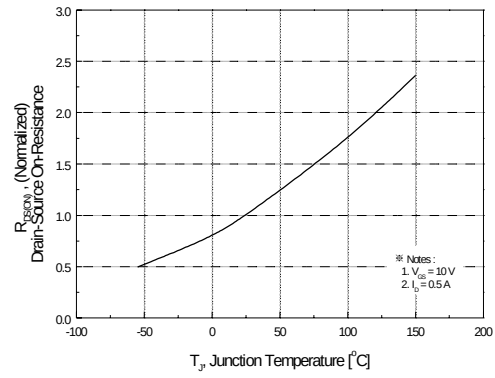


Figure 8. On-Resistance Variation vs Temperature

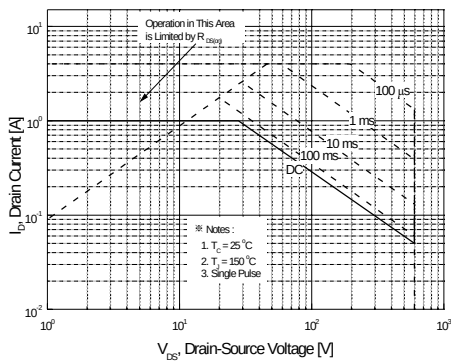


Figure 9. Maximum Safe Operating Area

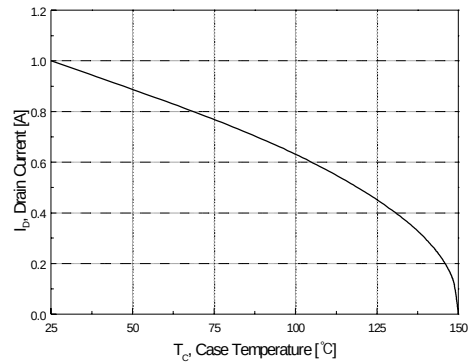


Figure 10. Maximum Drain Current vs Case Temperature

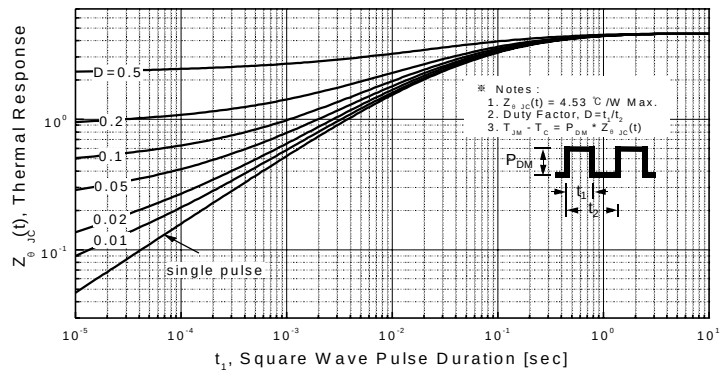
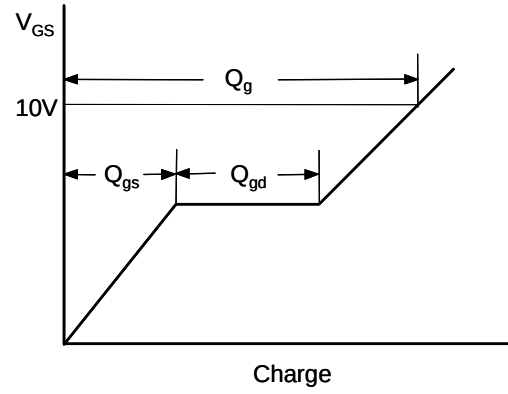
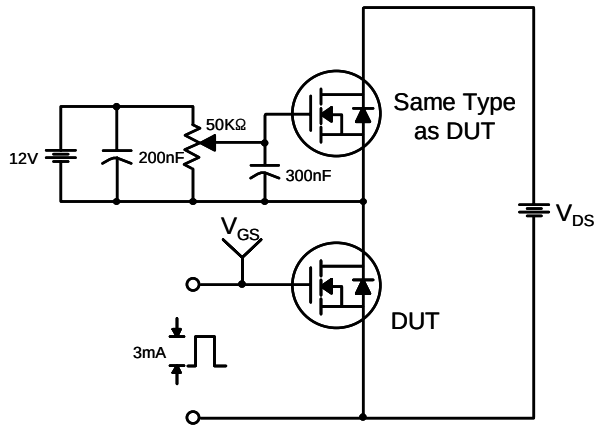
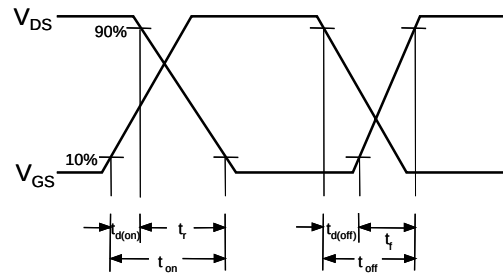
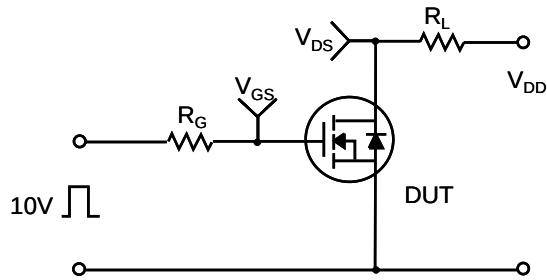


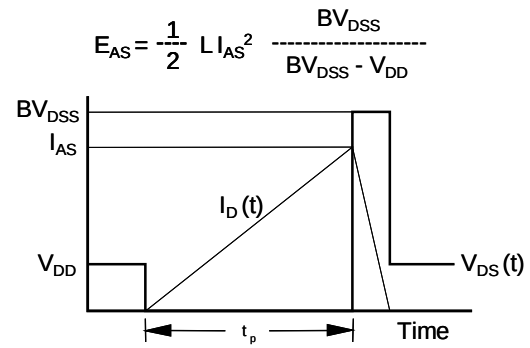
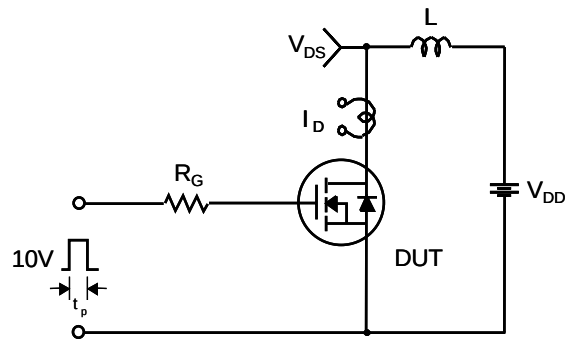
Figure 11. Transient Thermal Response Curve

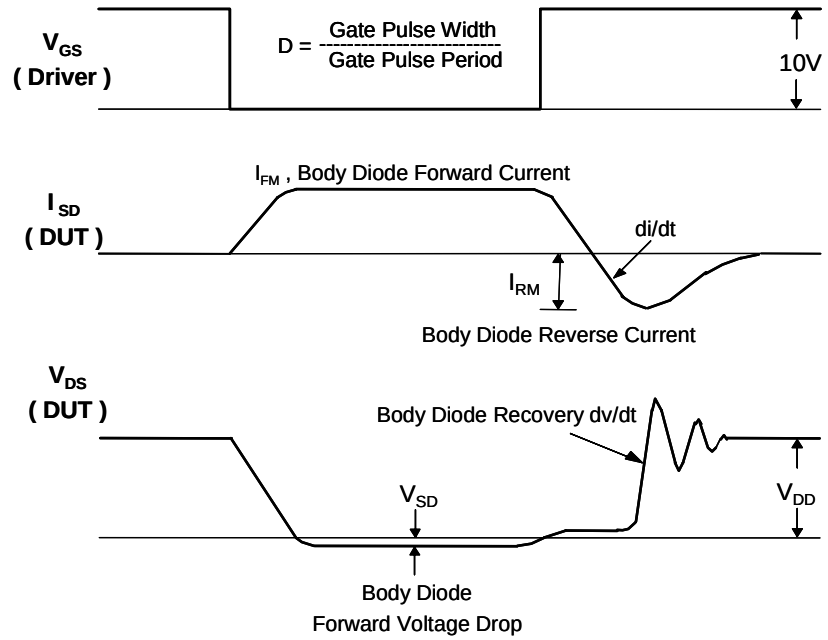
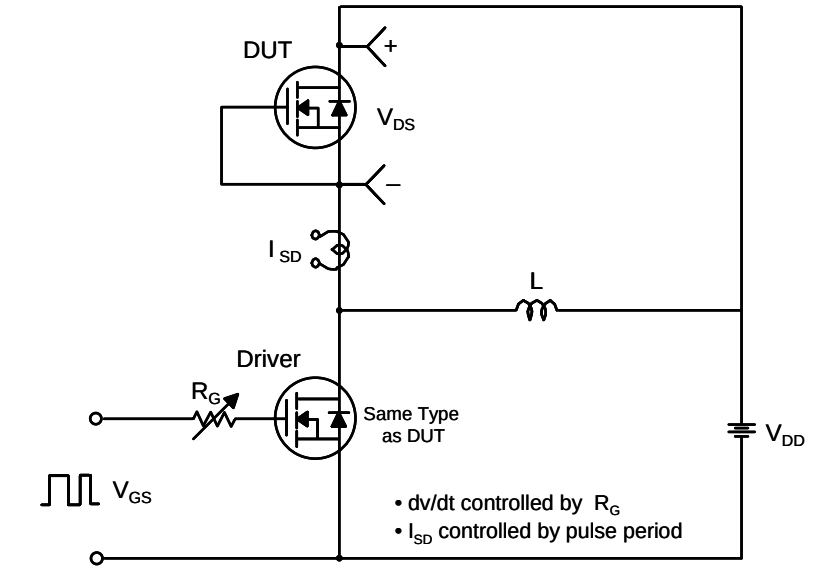


Resistive Switching Test Circuit & Waveforms

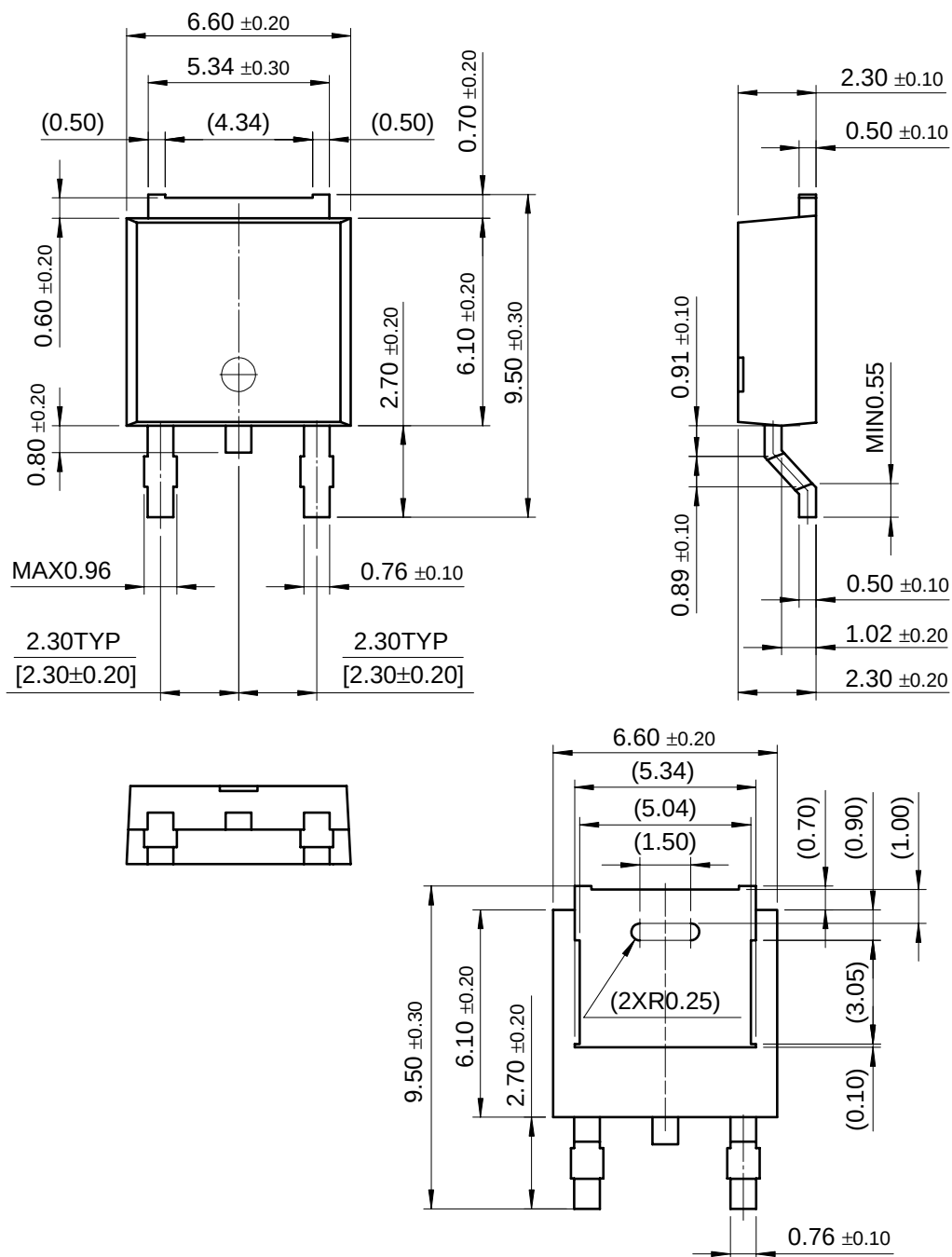


Unclamped Inductive Switching Test Circuit & Waveforms

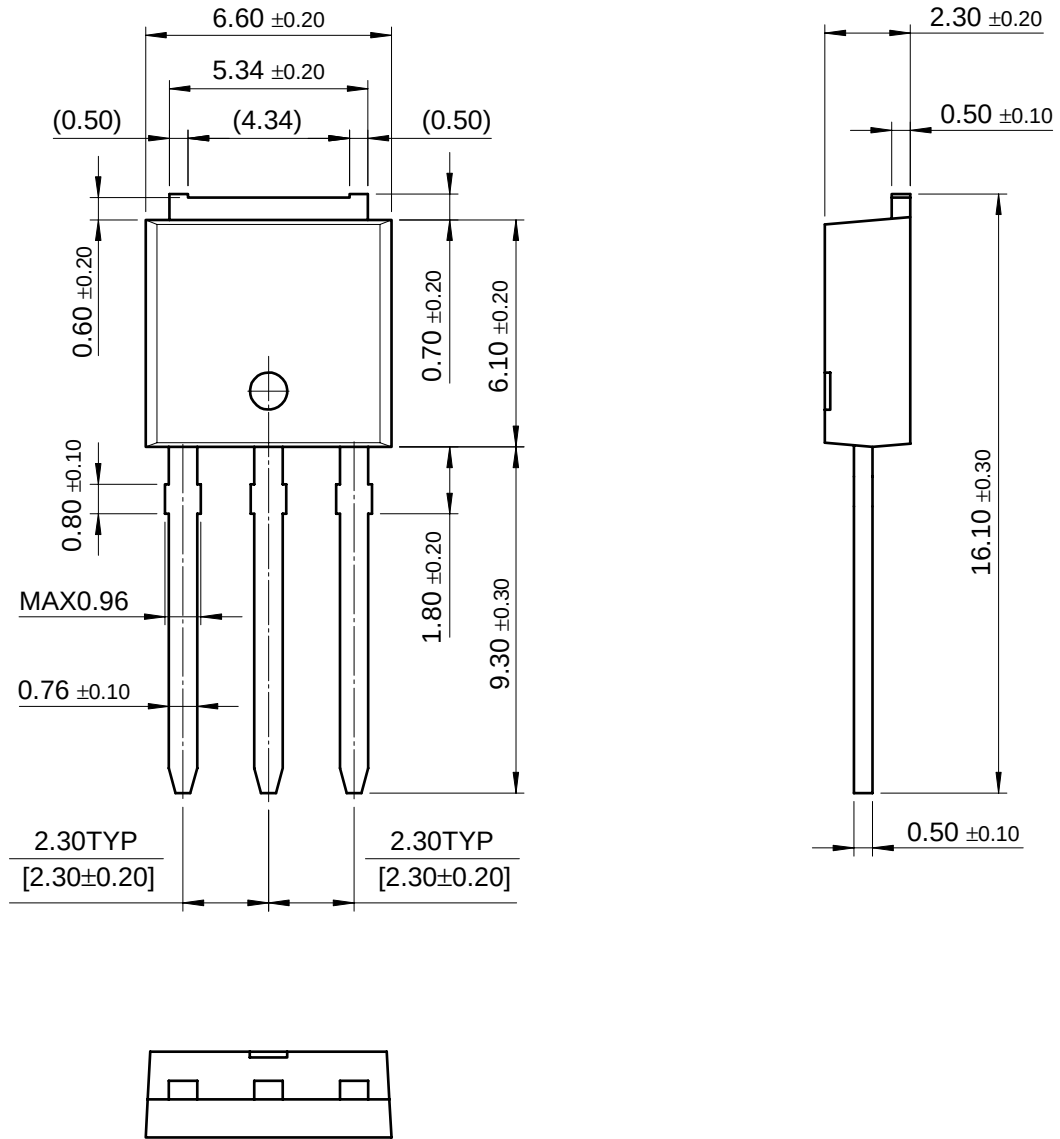




# D-PAK



# I-PAK





Компания «Life Electronics» занимается поставками электронных компонентов импортного и отечественного производства от производителей и со складов крупных дистрибьюторов Европы, Америки и Азии.

С конца 2013 года компания активно расширяет линейку поставок компонентов по направлению коаксиальный кабель, кварцевые генераторы и конденсаторы (керамические, пленочные, электролитические), за счёт заключения дистрибьюторских договоров

Мы предлагаем:

- Конкурентоспособные цены и скидки постоянным клиентам.
- Специальные условия для постоянных клиентов.
- Подбор аналогов.
- Поставку компонентов в любых объемах, удовлетворяющих вашим потребностям.
- Приемлемые сроки поставки, возможна ускоренная поставка.
- Доставку товара в любую точку России и стран СНГ.
- Комплексную поставку.
- Работу по проектам и поставку образцов.
- Формирование склада под заказчика.
- Сертификаты соответствия на поставляемую продукцию (по желанию клиента).
- Тестирование поставляемой продукции.
- Поставку компонентов, требующих военную и космическую приемку.
- Входной контроль качества.
- Наличие сертификата ISO.

В составе нашей компании организован Конструкторский отдел, призванный помогать разработчикам, и инженерам.

Конструкторский отдел помогает осуществить:

- Регистрацию проекта у производителя компонентов.
- Техническую поддержку проекта.
- Защиту от снятия компонента с производства.
- Оценку стоимости проекта по компонентам.
- Изготовление тестовой платы монтаж и пусконаладочные работы.



Тел: +7 (812) 336 43 04 (многоканальный)

Email: [org@lifeelectronics.ru](mailto:org@lifeelectronics.ru)

[www.lifeelectronics.ru](http://www.lifeelectronics.ru)