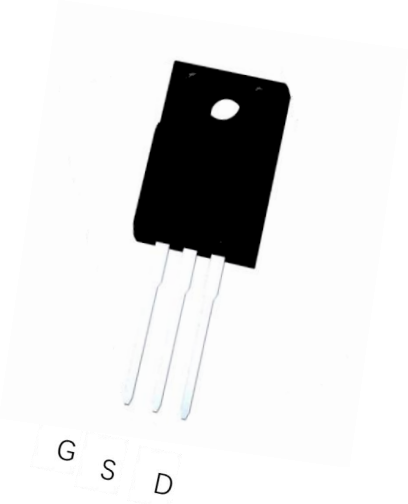
## Description

TK65T400 is an enhancement mode GaN-on-silicon transistor. GaN is a wide band gap semiconductor with high power density. The gallium nitride transistor is characterized by no body diode, so the reverse recovery charge is zero.

## Features



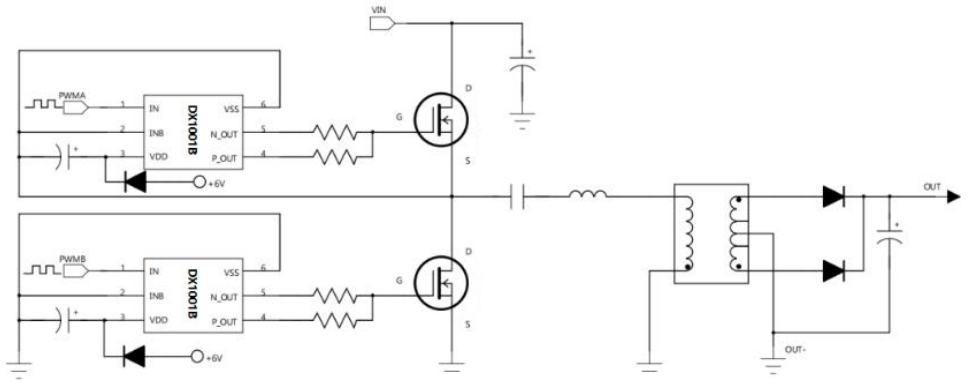

- 650 V enhancement mode power switch
- $R_{DS(on)}$ =400mΩ
- $I_{DS(max)}$ = 7A
- Easy gate drive requirements (0 V to 6 V)
- Very high switching frequency (> 10 MHz)
- Fast and controllable fall and rise times
- Zero reverse recovery loss

## Applications

- Fast Battery Charging
- LED lighting drivers
- Power Factor Correction
- LLC Converters
- Wireless Power Transfer

### Device Information

| Part Number | Package | Packing |
|---|---|---|
| TK65T400 | TO-220F | 50pcs/tube |




Typical application circuit of LLC

## Absolute Maximum Ratings(Tc=25℃ unless otherwise specified)

| Parameter | Symbol | Value | Unit | Condition |
|---|---|---|---|---|
| Drain-Source voltage | $V_{DS}$ | 650 | V | |
| Gate-source voltage | $V_{GS}$ | -10 to 6 | V | |
| Continuous drain current* | $I_D$ | 7 | A | Tc=25℃ |
| | | 4 | A | Tc=125℃ |
| Operation and storage temperature | $T_j$ | -55 to 150 | ℃ | |
| | $T_{stg}$ | -55 to 150 | ℃ | |

## Electrical Characteristics (Tc=25℃ unless otherwise specified)

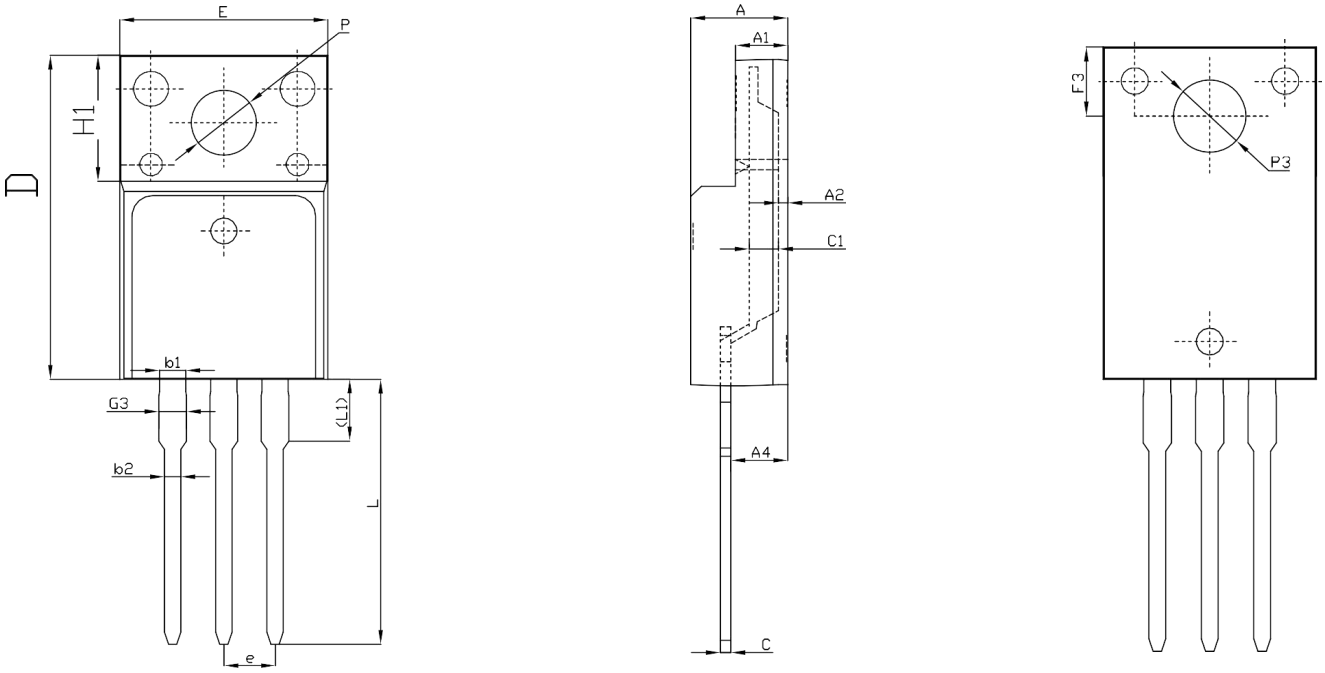
### Typical Performance – Static

| Parameter | Symbol | Values | | | Unit | Test condition |
|---|---|---|---|---|---|---|
| | | Min. | Type. | Max. | | |
| Drain source breakdown voltage | $BV_{DS}$ | 650 | / | / | V | VGS=0V, ID=20μA |
| Total drain leakage current | $I_{DSS}$ | / | 0.3 | 10 | μA | VDS=650V, VGS=0V, Tj=25℃ |
| | | / | 5 | 75 | μA | VDS=650V, VGS=0V, Tj=150℃ |
| Gate-to-source current | $I_{GSS}$ | / | 2 | / | μA | VDS=0V, VGS=6V, Tj=25℃ |
| Static drain-source on-resistance | $R_{DS(ON)}$ | / | 350 | 400 | mΩ | VGS=6V, ID=3A, Tj=25℃ |
| | | / | 650 | / | mΩ | VGS=6V, ID=3A, Tj=150℃ |
| Gate threshold voltage | $V_{GS(th)}$ | 1.2 | 1.6 | 2.0 | V | VDS=VGS, ID=3.5mA , |

## Typical Performance – Dynamic

| Parameter | Symbol | Values | | | Unit | Test condition |
|---|---|---|---|---|---|---|
| | | Min | Type | Max | | |
| Input capacitance | $C_{ISS}$ | / | 32 | / | pF | $V_{DS}$=400V, $V_{GS}$=0V, f=1MHz |
| Output capacitance | $C_{OSS}$ | / | 9 | / | pF | |
| Reverse transfer capacitance | $C_{RSS}$ | / | 0.3 | / | pF | |
| Output capacitance, energy related | $C_{OSS(er)}$ | / | 15 | / | pF | $V_{DS}$=0V to 400V,$V_{GS}$=0V |
| Output capacitance time related | $C_{OSS(tr)}$ | / | 21 | / | pF | |
| Total gate charge | $Q_G$ | / | 1.3 | / | nC | $V_{DS}$=400V, $V_{GS}$=0V to 6V |
| Gate-drain charge | $Q_{GD}$ | / | 0.6 | / | nC | |
| Gate-source charge | $Q_{GS}$ | / | 0.33 | / | nC | |
| Gate Resistance | $R_G$ | / | 2.88 | / | Ω | *f* = *f*res, Open drain |

## Package




| SYMBOL | mm | | |
|---|---|---|---|
| | MIN | NOM | MAX |
| E | 9.96 | 10.16 | 10.36 |
| A | 4.50 | 4.70 | 4.90 |
| A1 | 2.34 | 2.54 | 2.74 |
| A2 | 0.30 | 0.45 | 0.60 |
| A4 | 2.56 | 2.76 | 2.96 |
| c | 0.40 | 0.50 | 0.65 |
| c1 | 1.20 | 1.30 | 1.35 |
| D | 15.57 | 15.87 | 16.17 |
| H1 | 6.70REF | | |
| e | 2.54BSC | | |
| L | 12.68 | 12.98 | 13.28 |
| L1 | 2.93 | 3.03 | 3.13 |
| P | 3.03 | 3.18 | 3.38 |
| P3 | 3.15 | 3.45 | 3.65 |
| F3 | 3.15 | 3.30 | 3.45 |
| G3 | 1.25 | 1.35 | 1.55 |
| b1 | 1.18 | 1.28 | 1.43 |
| b2 | 0.70 | 0.80 | 0.95 |