

## DESCRIPTION

The RTR040N03TL is the N-Channel logic enhancement mode power field effect transistor is produced using high cell density advanced trench technology..

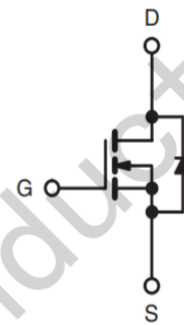
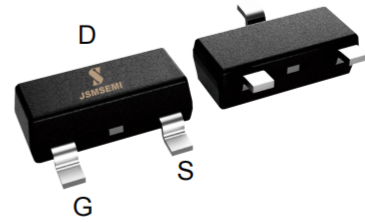
This high density process is especially tailored to minimize on-state resistance. These devices are particularly suited for low voltage application, and low in-line power loss are needed in a very small outline surface mount package.

## FEATURE

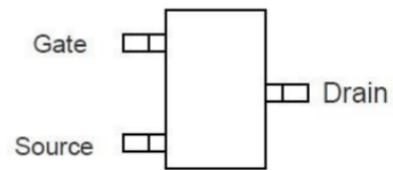
- ◆ 30V/6.0A,  $R_{DS(ON)}=18m\Omega(\text{typ.})@V_{GS}=10V$
- ◆ 30V/4.8A,  $R_{DS(ON)}=25m\Omega(\text{typ.})@V_{GS}=4.5V$
- ◆ Super high design for extremely low  $R_{DS(ON)}$
- ◆ Exceptional on-resistance and Maximum DC current capability
- ◆ Full RoHS compliance
- ◆ SOT23 package design

## APPLICATIONS

- ◆ Power Management
- ◆ Portable Equipment
- ◆ DC/DC Converter
- ◆ Load Switch
- ◆ DSC



N-Channel MOSFET



TOP VIEW  
SOT-23

## ABSOLUTE MAXIMUM RATINGS ( $T_A=25^\circ\text{C}$ Unless otherwise noted )

| Symbol           | Parameter                                       |                      | Typical  | Unit |
|------------------|-------------------------------------------------|----------------------|----------|------|
| V <sub>DSS</sub> | Drain-Source Voltage                            |                      | 30       | V    |
| V <sub>GSS</sub> | Gate-Source Voltage                             |                      | ±20      | V    |
| I <sub>D</sub>   | Continuous Drain Current (T <sub>C</sub> =25°C) | V <sub>GS</sub> =10V | 6.0      | A    |
|                  | Continuous Drain Current (T <sub>C</sub> =70°C) |                      | 5.0      |      |
| I <sub>DM</sub>  | Pulsed Drain Current                            |                      | 20       | A    |
| I <sub>S</sub>   | Continuous Source Current (Diode Conduction)    |                      | 1.5      | A    |
| P <sub>D</sub>   | Power Dissipation                               | T <sub>A</sub> =25°C | 1.5      | W    |
|                  |                                                 | T <sub>A</sub> =70°C | 0.9      |      |
| T <sub>J</sub>   | Operation Junction Temperature                  |                      | 150      | °C   |
| T <sub>STG</sub> | Storage Temperature Range                       |                      | -55~+150 | °C   |
| R <sub>θJA</sub> | Thermal Resistance Junction to Ambient          |                      | 90       | °C/W |

**Note: Absolute maximum ratings are those values beyond which the device could be permanently damaged.**

**Absolute maximum ratings are stress rating only and functional device operation is not implied**

**ELECTRICAL CHARACTERISTICS** ( $T_A=25^{\circ}\text{C}$  Unless otherwise noted)

| Symbol               | Parameter                       | Condition                                                             | Min | Typ | Max  | Unit |
|----------------------|---------------------------------|-----------------------------------------------------------------------|-----|-----|------|------|
| Static Parameters    |                                 |                                                                       |     |     |      |      |
| V <sub>(BR)DSS</sub> | Drain-Source Breakdown Voltage  | V <sub>GS</sub> =0V, I <sub>D</sub> =250uA                            | 30  |     |      | V    |
| V <sub>GS(th)</sub>  | Gate Threshold Voltage          | V <sub>DS</sub> =V <sub>GS</sub> , I <sub>D</sub> =250uA              | 1   |     | 2    | V    |
| I <sub>GSS</sub>     | Gate Leakage Current            | V <sub>DS</sub> =0V, V <sub>GS</sub> =±20V                            |     |     | ±100 | nA   |
| I <sub>DSS</sub>     | Zero Gate Voltage Drain Current | V <sub>DS</sub> =24V, V <sub>GS</sub> =0                              |     |     | 1    | uA   |
|                      |                                 | V <sub>DS</sub> =24V, V <sub>GS</sub> =0<br>T <sub>J</sub> =55°C      |     |     | 5    |      |
| R <sub>DS(ON)</sub>  | Drain-Source On-Resistance      | V <sub>GS</sub> =10V, I <sub>D</sub> =6.0A                            |     | 18  | 30   | mΩ   |
|                      |                                 | V <sub>GS</sub> =4.5V, I <sub>D</sub> =4.8A                           |     | 25  | 40   |      |
| Source-Drain Diode   |                                 |                                                                       |     |     |      |      |
| V <sub>SD</sub>      | Diode Forward Voltage           | I <sub>S</sub> =1.0A, V <sub>GS</sub> =0V                             |     | 0.7 | 1.0  | V    |
| Dynamic Parameters   |                                 |                                                                       |     |     |      |      |
| Q <sub>g</sub>       | Total Gate Charge               | V <sub>DS</sub> =20V<br>V <sub>GS</sub> =4.5V<br>I <sub>D</sub> =6.0A |     | 6   |      | nC   |
| Q <sub>gs</sub>      | Gate-Source Charge              |                                                                       |     | 1.1 |      |      |
| Q <sub>gd</sub>      | Gate-Drain Charge               |                                                                       |     | 2.5 |      |      |
| C <sub>iss</sub>     | Input Capacitance               | V <sub>DS</sub> =15V<br>V <sub>GS</sub> =0V<br>f=1MHz                 |     | 414 |      | pF   |
| C <sub>oss</sub>     | Output Capacitance              |                                                                       |     | 60  |      |      |
| C <sub>rss</sub>     | Reverse Transfer Capacitance    |                                                                       |     | 49  |      |      |
| T <sub>d(on)</sub>   | Turn-On Time                    | V <sub>DS</sub> =15V<br>I <sub>D</sub> =5A                            |     | 7.5 |      | nS   |
| T <sub>r</sub>       |                                 |                                                                       |     | 45  |      |      |
| T <sub>d(off)</sub>  | Turn-Off Time                   | V <sub>GEN</sub> =10V<br>R <sub>G</sub> =3.3Ω                         |     | 10  |      |      |
| T <sub>f</sub>       |                                 |                                                                       |     | 4   |      |      |

**Note: 1. Pulse test: pulse width $\leq 300\mu\text{s}$ , duty cycle $\leq 2\%$**

**2. Static parameters are based on package level with recommended wire bonding**

■ TYPICAL CHARACTERISTICS (25°C Unless Note)



■ TYPICAL CHARACTERISTICS (continuous)

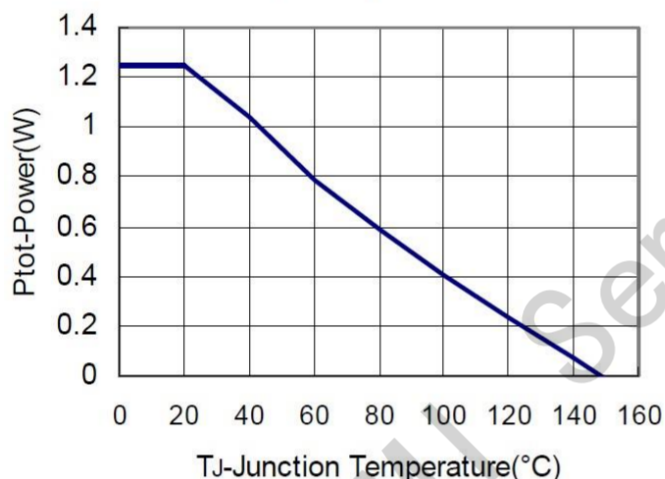
Source Drain Diode Forward



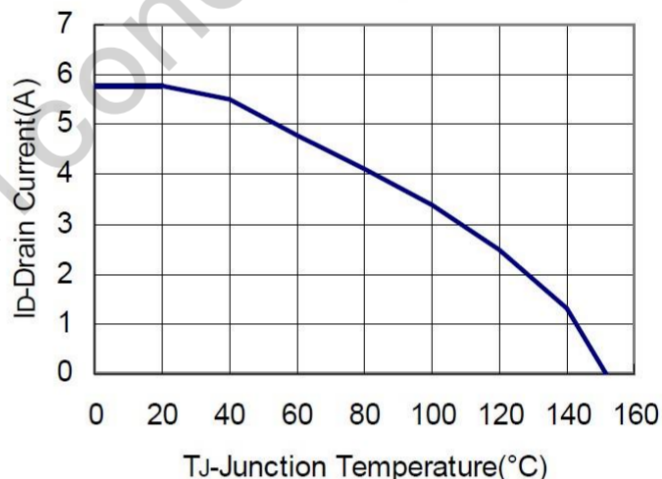
Capacitance



Power Dissipation



Drain Current



Thermal Transient Impedance



## Package Information

SOT-23



| Symbol | Dimensions in Millimeters(mm) |       | Dimensions In Inches |       |
|--------|-------------------------------|-------|----------------------|-------|
|        | Min                           | Max   | Min                  | Max   |
| A      | 0.900                         | 1.150 | 0.035                | 0.045 |
| A1     | 0.000                         | 0.100 | 0.000                | 0.004 |
| A2     | 0.900                         | 1.050 | 0.035                | 0.041 |
| b      | 0.300                         | 0.500 | 0.012                | 0.020 |
| c      | 0.080                         | 0.150 | 0.003                | 0.006 |
| D      | 2.800                         | 3.000 | 0.110                | 0.118 |
| E      | 1.200                         | 1.400 | 0.047                | 0.055 |
| E1     | 2.250                         | 2.550 | 0.089                | 0.100 |
| e      | 0.950TYP                      |       | 0.037TYP             |       |
| e1     | 1.800                         | 2.000 | 0.071                | 0.079 |
| L      | 0.550REF                      |       | 0.022REF             |       |
| L1     | 0.300                         | 0.500 | 0.012                | 0.020 |
| θ      | 0°                            | 8°    | 0°                   | 8°    |