# MJ P-Channel Enhancement Mode Power MOSFET

## Description

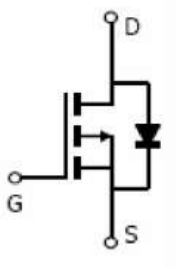
The MJ55P15K uses advanced trench technology and design to provide excellent $R_{DS(ON)}$ with low gate charge. It can be used in a wide variety of applications.

## General Features

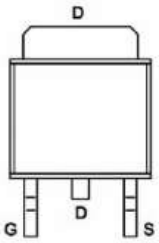
- $V_{DS}$ =-55V,$I_D$ =-15A
  $R_{DS(ON)}$ <75mΩ @ $V_{GS}$=-10V
- High density cell design for ultra low Rdson
- Fully characterized avalanche voltage and current
- Excellent package for good heat dissipation

## Application

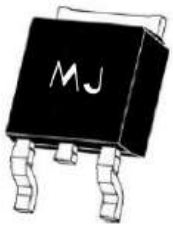
- Power switch
- Load switch in high current applications
- DC/DC converters




Schematic diagram




Marking and pin assignment




TO-252-2L top view

**100% UIS TESTED! 100% ΔVds TESTED!**

## Package Marking and Ordering Information

| Device Marking | Device | Device Package | Reel Size | Tape width | Quantity |
|---|---|---|---|---|---|
| MJ55P15K | MJ55P15K | TO-252-2L | - | - | - |

## Absolute Maximum Ratings ($T_C$ =25 ℃unless otherwise noted)

| Parameter | Symbol | Limit | Unit |
|---|---|---|---|
| Drain-Source Voltage | $V_{DS}$ | -55 | V |
| Gate-Source Voltage | $V_{GS}$ | ±20 | V |
| Drain Current-Continuous | $I_D$ | -15 | A |
| Drain Current-Continuous($T_C$ =100℃) | $I_{D(100℃)}$ | -10 | A |
| Pulsed Drain Current | $I_{DM}$ | -50 | A |
| Maximum Power Dissipation | $P_D$ | 35 | W |
| Operating Junction and Storage Temperature Range | $T_J$ ,$T_{STG}$ | -55 To 150 | ℃ |

## Thermal Characteristic

| | | | |
|---|---|---|---|
| Thermal Resistance,Junction-to-Case (Note 2) | $R_{\theta JC}$ | 4.3 | ℃/W |

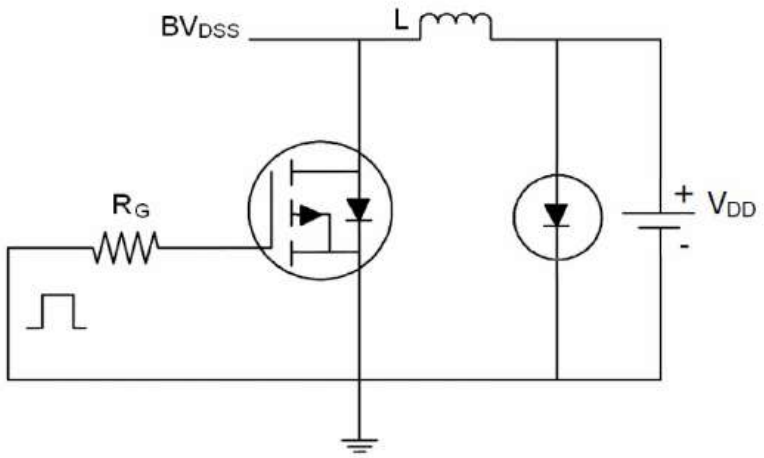
## Electrical Characteristics ($T_C$ =25℃unless otherwise noted)

| Parameter | Symbol | Condition | Min | Typ | Max | Unit |
|---|---|---|---|---|---|---|
| **Off Characteristics** | | | | | | |
| Drain-Source Breakdown Voltage | $BV_{DSS}$ | $V_{GS}$=0V $I_D$=-250μA | -55 | - | - | V |
| Zero Gate Voltage Drain Current | $I_{DSS}$ | $V_{DS}$=-55V,$V_{GS}$=0V | - | - | 1 | μA |
| Gate-Body Leakage Current | $I_{GSS}$ | $V_{DS}$=±20V,$V_{DS}$=0V | - | - | ±100 | nA |
| **On Characteristics** (Note 3) | | | | | | |
| Gate Threshold Voltage | $V_{GS(th)}$ | $V_{DS}$=$V_{GS}$ ,$I_D$=-250μA | -1.5 | -2.6 | -3.5 | V |
| Drain-Source On-State Resistance | $R_{DS(ON)}$ | $V_{GS}$=-10V, $I_D$=-5A | - | 60 | 75 | mΩ |
| Forward Transconductance | $g_{FS}$ | $V_{DS}$=-15V,$I_D$=-5A | 16 | - | - | S |
| **Dynamic Characteristics** (Note 4) | | | | | | |
| Input Capacitance | $C_{lss}$ | $V_{DS}$=-20V,$V_{GS}$=0V F=1.0MHz | - | 1450 | - | PF |
| Output Capacitance | $C_{oss}$ | | - | 145 | - | PF |
| Reverse Transfer Capacitance | $C_{rss}$ | | - | 110 | - | PF |
| **Switching Characteristics** (Note 4) | | | | | | |
| Turn-on Delay Time | $t_{d(on)}$ | $V_{DD}$=-30V,$R_L$=30Ω $V_{GS}$=-10V,$R_{GEN}$=6Ω | - | 8 | - | nS |
| Turn-on Rise Time | $t_r$ | | - | 9 | - | nS |
| Turn-Off Delay Time | $t_{d(off)}$ | | - | 65 | - | nS |
| Turn-Off Fall Time | $t_f$ | | - | 30 | - | nS |
| Total Gate Charge | $Q_g$ | $V_{DS}$=-30V,$I_D$=-5A $V_{GS}$=-10V | - | 26 | - | nC |
| Gate-Source Charge | $Q_{gs}$ | | - | 4.5 | - | nC |
| Gate-Drain Charge | $Q_{gd}$ | | - | 7 | - | nC |
| **Drain-Source Diode Characteristics** | | | | | | |
| Diode Forward Voltage (Note 3) | $V_{SD}$ | $V_{GS}$=0V,$I_S$=-15A | - | - | 1.2 | V |
| Diode Forward Current (Note 2) | $I_S$ | | - | - | -15 | A |

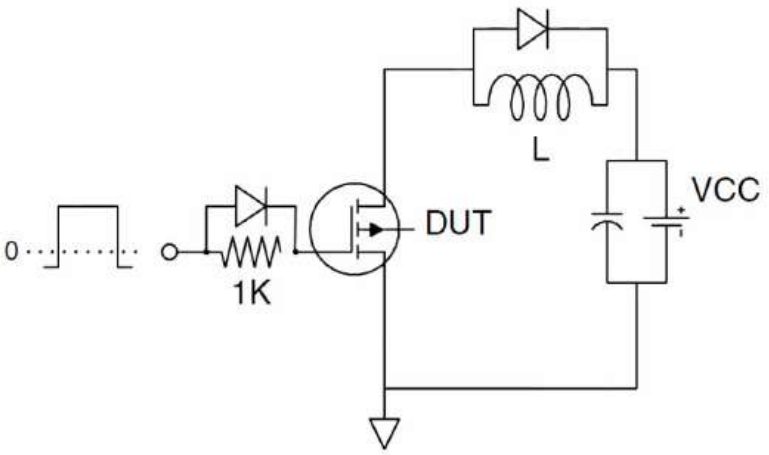
**Notes:**

① Repetitive Rating: Pulse width limited by maximum junction temperature.
② Surface Mounted on FR4 Board, t ≤ 10 sec.
③ Pulse Test: Pulse Width ≤ 300μs, Duty Cycle ≤ 2%.
④ Guaranteed by design, not subject to production

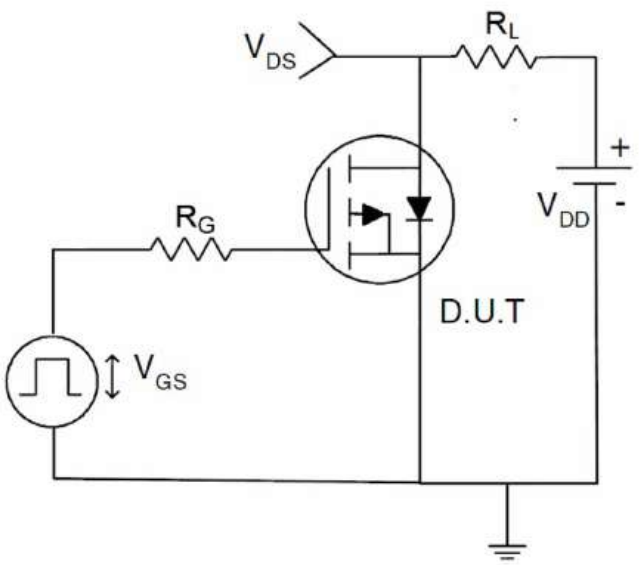
Test circuit




EAS test Circuit

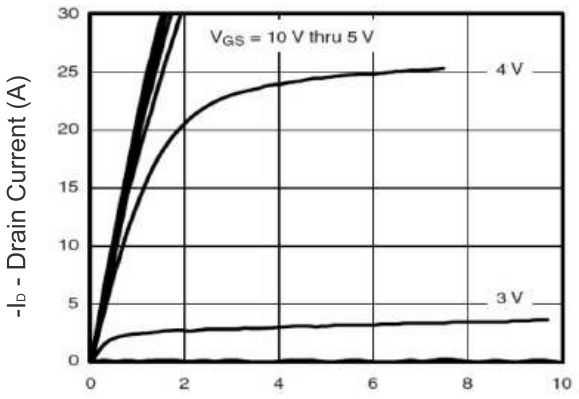



Gate charge test Circuit



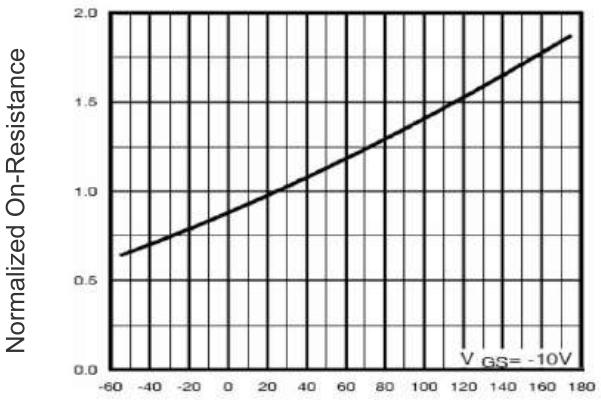

Switch Time Test Circuit

## Typical Electrical and Thermal Characteristics (Curves)



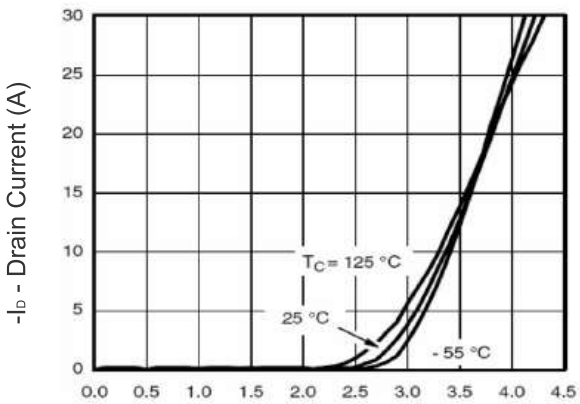

-Vds Drain-Source Voltage (V)

Figure 1 Output Characteristics



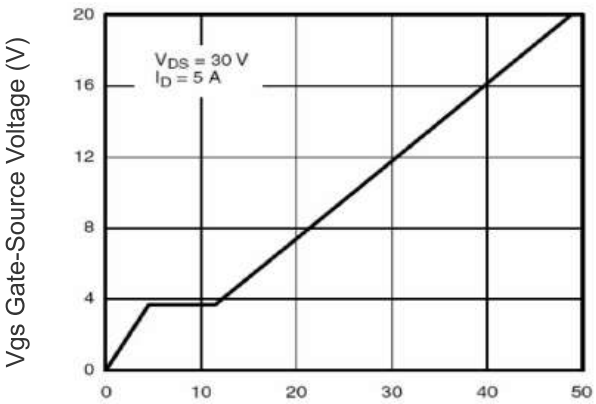

TJ -Junction Temperature(℃)

Figure 4 Rdson-Junction Temperature



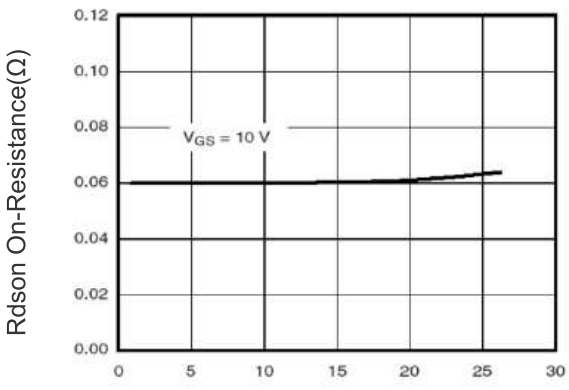

-Vgs Gate-Source Voltage (V)

Figure 2 Transfer Characteristics



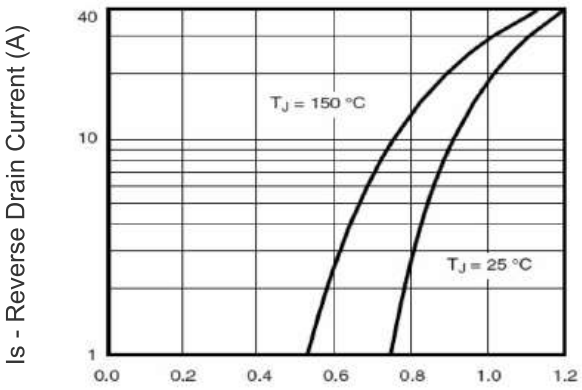

Qg Gate Charge (nC)

Figure 5 Gate Charge




-ID - Drain Current (A)

Figure 3 Rdson- Drain Current




Vsd Source-Drain Voltage (V)

Figure 6 Source- Drain Diode Forward

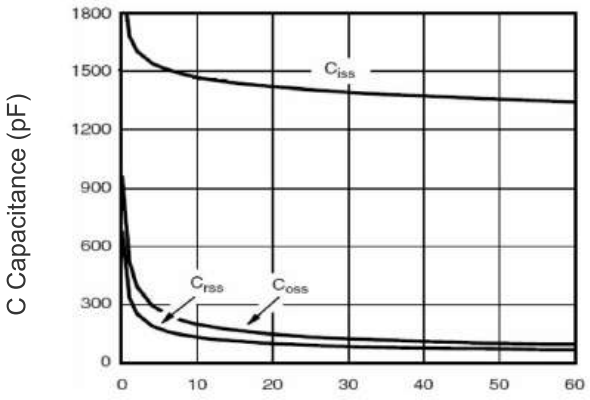



Figure 7 Capacitance vs Vds

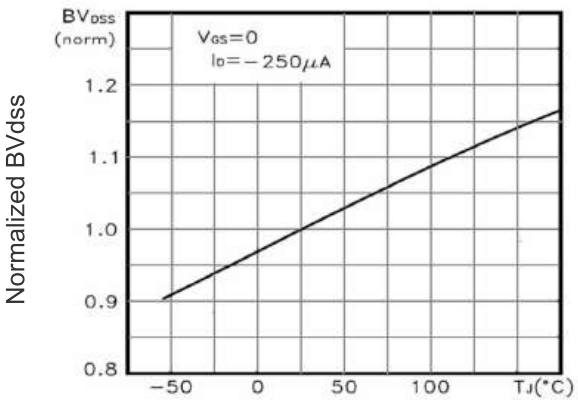



Figure 9 $BV_{DSS}$ vs Junction Temperature

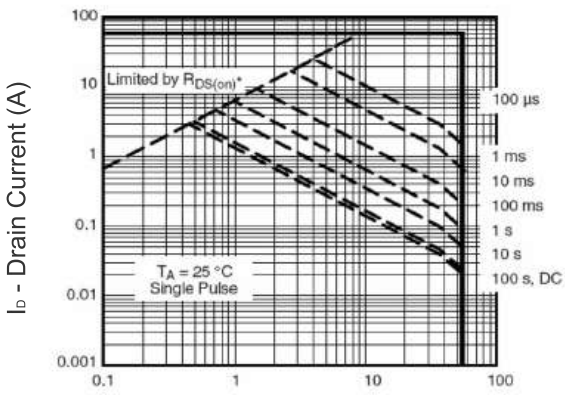



Figure 8 Safe Operation Area

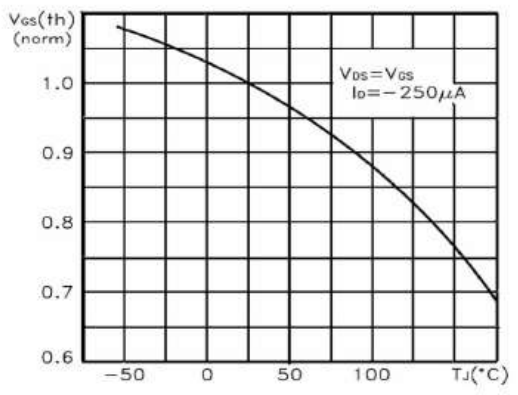



Figure 10 $V_{GS(th)}$ vs Junction Temperature

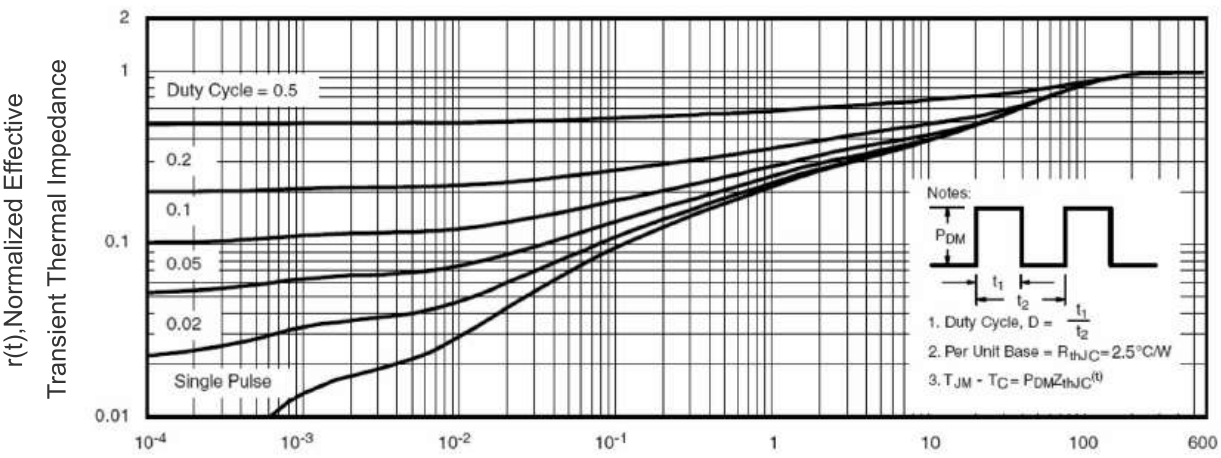
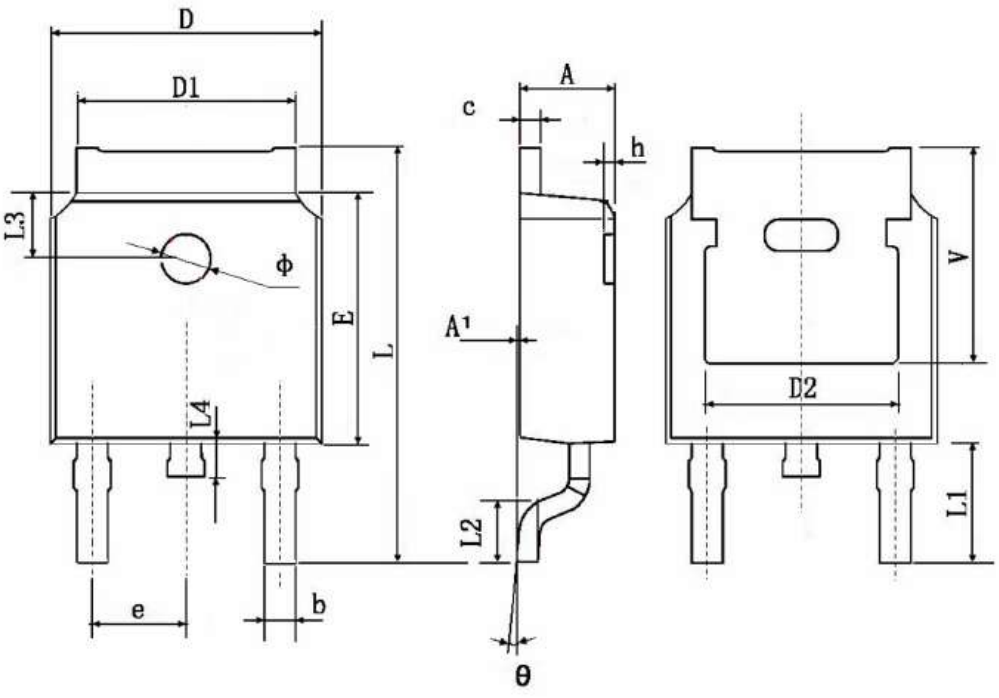



Figure 11 Normalized Maximum Transient Thermal Impedance

## TO-252 Package Information




| Symbol | Dimensions In Millimeters | | Dimensions In Inches | |
|---|---|---|---|---|
| | Min. | Max. | Min. | Max. |
| A | 2.200 | 2.400 | 0.087 | 0.094 |
| A1 | 0.000 | 0.127 | 0.000 | 0.005 |
| b | 0.660 | 0.860 | 0.026 | 0.034 |
| c | 0.460 | 0.580 | 0.018 | 0.023 |
| D | 6.500 | 6.700 | 0.256 | 0.264 |
| D1 | 5.100 | 5.460 | 0.201 | 0.215 |
| D2 | 4.830 TYP. | | 0.190 TYP. | |
| E | 6.000 | 6.200 | 0.236 | 0.244 |
| e | 2.186 | 2.386 | 0.086 | 0.094 |
| L | 9.800 | 10.400 | 0.386 | 0.409 |
| L1 | 2.900 TYP. | | 0.114 TYP. | |
| L2 | 1.400 | 1.700 | 0.055 | 0.067 |
| L3 | 1.600 TYP. | | 0.063 TYP. | |
| L4 | 0.600 | 1.000 | 0.024 | 0.039 |
| Φ | 1.100 | 1.300 | 0.043 | 0.051 |
| θ | 0° | 8° | 0° | 8° |
| h | 0.000 | 0.300 | 0.000 | 0.012 |
| V | 5.350 TYP. | | 0.211 TYP. | |

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