

P-Channel 20-V (D-S) MOSFET

| PRODUCT SUMMARY | | | |
|---------------------|---------------------------------|---------------------------------|-----------------------|
| V _{DS} (V) | R _{DS(on)} (mΩ)(Typ.) | I _D (A) ^a | Q _g (Typ.) |
| -20 | 115 at V _{GS} = -10 V | -3.8 | 9.5 nC |
| | 168 at V _{GS} = -4.5 V | | |

FEATURES

- DT-Trench Power MOSFET
- 100 % R_g and UIS Tested

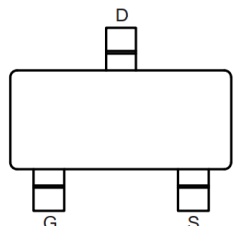


RoHS
COMPLIANT

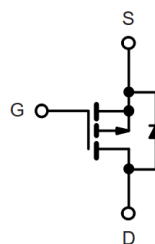
APPLICATIONS

- Load Switches
 - Notebook PCs
 - Desktop PCs

SOT-23 Pin Configuration



Top View



P-Channel MOSFET

| ABSOLUTE MAXIMUM RATINGS (T _C = 25 °C, unless otherwise noted) | | | | |
|---|-------------------------|-----------------------------------|---------------|------|
| PARAMETER | | SYMBOL | LIMIT | UNIT |
| Drain-Source Voltage | | V _{DS} | - 20 | V |
| Gate-Source Voltage | | V _{GS} | ± 8 | |
| Continuous Drain Current | T _C = 25 °C | I _D | -3.8 | A |
| | T _C = 125 °C | | -2.5 | |
| Continuous Source Current (Diode Conduction) | | I _S | - 2.5 | |
| Pulsed Drain Current ^a | | I _{DM} | - 10 | |
| Single Pulse Avalanche Current | L = 0.1 mH | I _{AS} | - 11 | |
| Single Pulse Avalanche Energy | | E _{AS} | 5 | |
| Maximum Power Dissipation ^a | T _C = 25 °C | P _D | 2.2 | W |
| | T _C = 125 °C | | 0.7 | |
| Operating Junction and Storage Temperature Range | | T _J , T _{stg} | - 55 to + 175 | °C |

| THERMAL RESISTANCE RATINGS | | | | |
|----------------------------|------------------------|-------------------|-------|------|
| PARAMETER | | SYMBOL | LIMIT | UNIT |
| Junction-to-Ambient | PCB Mount ^b | R _{thJA} | 175 | °C/W |
| Junction-to-Foot (Drain) | | R _{thJF} | 75 | |

Notes:

a. Based on T_C = 25 °C.

b. Maximum under Steady State conditions is 185 °C/W.

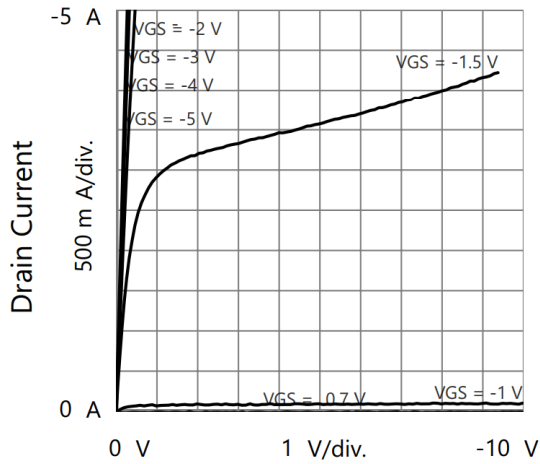
| SPECIFICATIONS ($T_C = 25\text{ }^\circ\text{C}$, unless otherwise noted) | | | | | | | |
|--|--------------|--|--|-------|------|-----------|------------------|
| PARAMETER | SYMBOL | TEST CONDITIONS | | MIN. | TYP. | MAX. | UNIT |
| Static | | | | | | | |
| Drain-Source Breakdown Voltage | V_{DS} | $V_{GS} = 0\text{ V}, I_D = -250\text{ }\mu\text{A}$ | | -20 | - | - | V |
| Gate-Source Threshold Voltage | $V_{GS(th)}$ | $V_{DS} = V_{GS}, I_D = -250\text{ }\mu\text{A}$ | | -0.45 | - | -0.95 | |
| Gate-Source Leakage | I_{GSS} | $V_{DS} = 0\text{ V}, V_{GS} = \pm 8\text{ V}$ | | - | - | ± 100 | nA |
| Zero Gate Voltage Drain Current | I_{DSS} | $V_{GS} = 0\text{ V}$ | $V_{DS} = -12\text{ V}$ | - | - | -1 | μA |
| | | $V_{GS} = 0\text{ V}$ | $V_{DS} = -12\text{ V}, T_J = 125\text{ }^\circ\text{C}$ | - | - | -50 | |
| | | $V_{GS} = 0\text{ V}$ | $V_{DS} = -12\text{ V}, T_J = 175\text{ }^\circ\text{C}$ | - | - | -150 | |
| On-State Drain Current ^a | $I_{D(on)}$ | $V_{GS} = -4.5\text{ V}$ | $V_{DS} \leq -5\text{ V}$ | -4 | - | - | A |
| Drain-Source On-State Resistance ^a | $R_{DS(on)}$ | $V_{GS} = -4.5\text{ V}$ | $I_D = -3.5\text{ A}$ | - | 115 | 135 | $\text{m}\Omega$ |
| | | $V_{GS} = -4.5\text{ V}$ | $I_D = -1.5\text{ A}, T_J = 125\text{ }^\circ\text{C}$ | - | 128 | 160 | |
| | | $V_{GS} = -4.5\text{ V}$ | $I_D = -1.0\text{ A}, T_J = 175\text{ }^\circ\text{C}$ | - | 149 | 185 | |
| | | $V_{GS} = -2.5\text{ V}$ | $I_D = -1\text{ A}$ | - | 168 | 205 | |
| Forward Transconductance ^b | g_{fs} | $V_{DS} = -5\text{ V}, I_D = -3.5\text{ A}$ | | - | 3 | - | S |
| Dynamic^b | | | | | | | |
| Input Capacitance | C_{iss} | $V_{GS} = 0\text{ V}$ | $V_{DS} = -6\text{ V}, f = 1\text{ MHz}$ | - | 542 | - | pF |
| Output Capacitance | C_{oss} | | | - | 96 | - | |
| Reverse Transfer Capacitance | C_{rss} | | | - | 77 | - | |
| Total Gate Charge ^c | Q_g | $V_{GS} = -4.5\text{ V}$ | $V_{DS} = -6\text{ V}, I_D = -3.5\text{ A}$ | - | 9.5 | - | nC |
| Gate-Source Charge ^c | Q_{gs} | | | - | 2 | - | |
| Gate-Drain Charge ^c | Q_{gd} | | | - | 2.5 | - | |
| Gate Resistance | R_g | $f = 1\text{ MHz}$ | | - | 8 | - | Ω |
| Turn-On Delay Time ^c | $t_{d(on)}$ | $V_{DD} = -6\text{ V}, R_L = 1.6\text{ }\Omega$ $I_D \cong -3.5\text{ A}, V_{GEN} = -4.5\text{ V}, R_g = 1\text{ }\Omega$ | | - | 8 | - | ns |
| Rise Time ^c | t_r | | | - | 20 | - | |
| Turn-Off Delay Time ^c | $t_{d(off)}$ | | | - | 30 | - | |
| Fall Time ^c | t_f | | | - | 15 | - | |
| Source-Drain Diode Ratings and Characteristics^b | | | | | | | |
| Continuous Source-Drain Diode Current | I_S | $T_C = 25\text{ }^\circ\text{C}$ | | - | -3.8 | - | A |
| Pulse Diode Forward Current | I_{SM} | | | - | -10 | - | |
| Body Diode Voltage | V_{SD} | $I_S = -1\text{ A}, V_{GS} = 0\text{ V}$ | | - | -0.5 | -1 | V |

Notes

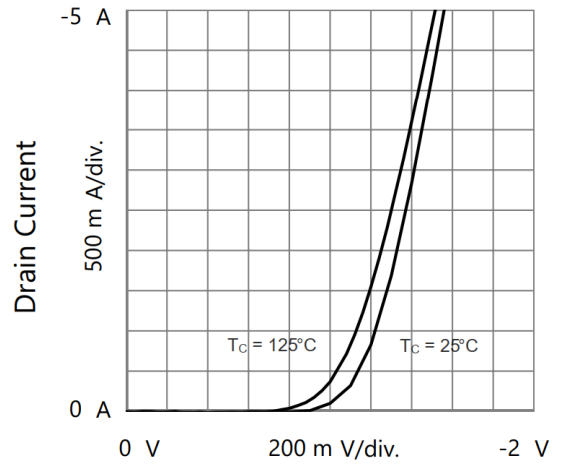
- Pulse test; pulse width $\leq 300\text{ }\mu\text{s}$, duty cycle $\leq 2\%$.
- Guaranteed by design, not subject to production testing.
- Independent of operating temperature.

Stresses beyond those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated in the operational sections of the specifications is not implied. Exposure to absolute maximum rating conditions for extended periods may affect device reliability.

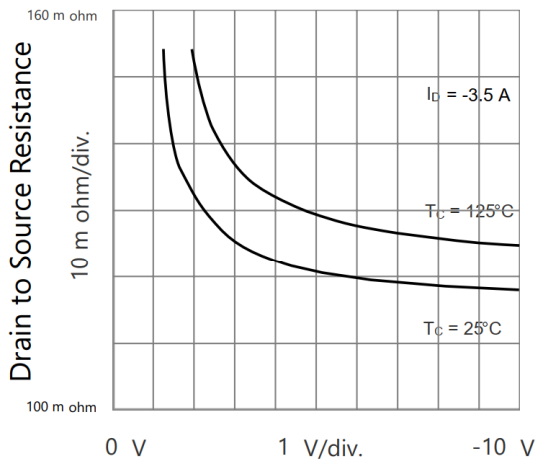
TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)



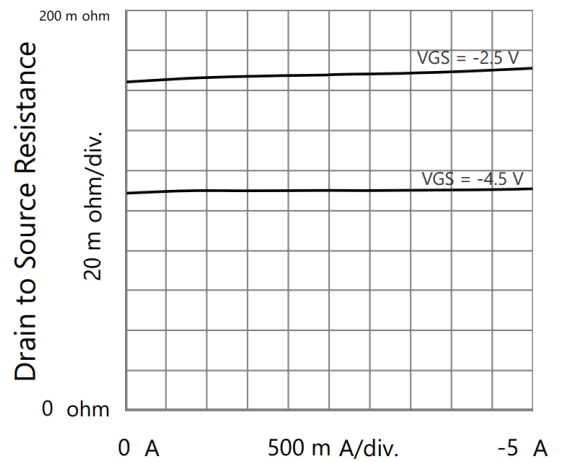
Drain to Source Voltage Output Characteristics



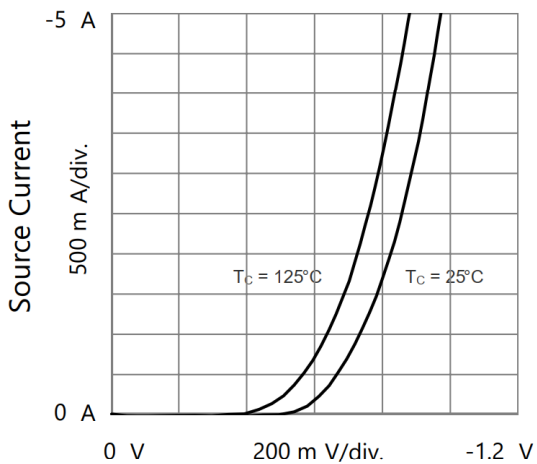
Gate to Source Voltage Transfer Characteristics



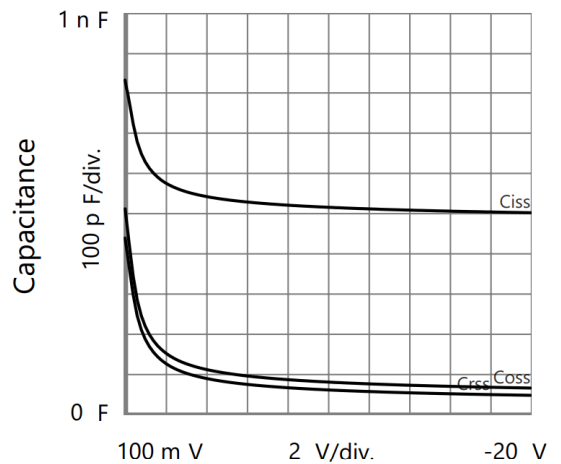
Gate to Source Voltage Drain to Source Resistance vs. Gate to Source Voltage



Drain Current Drain to Source Resistance vs. Drain Current

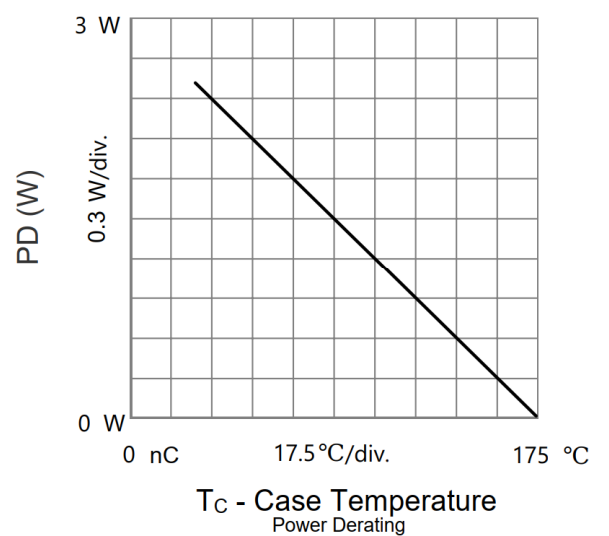
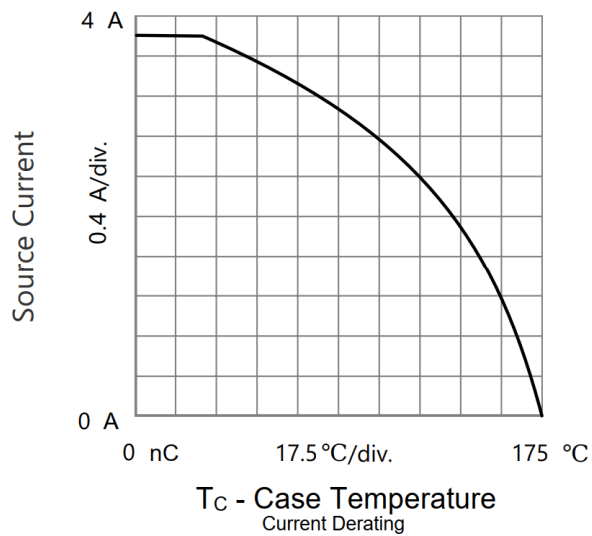
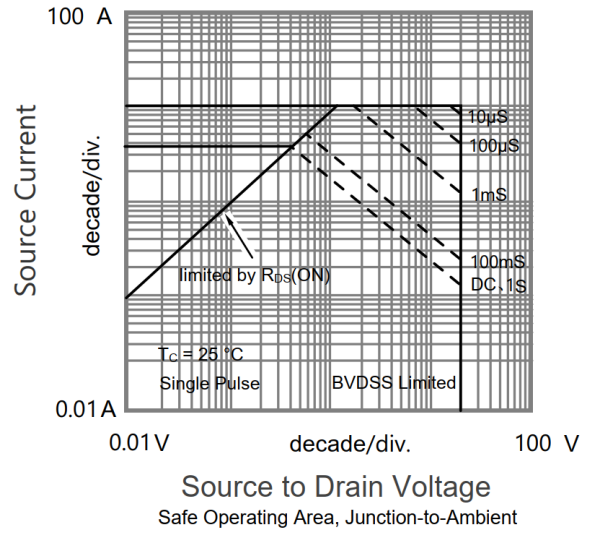
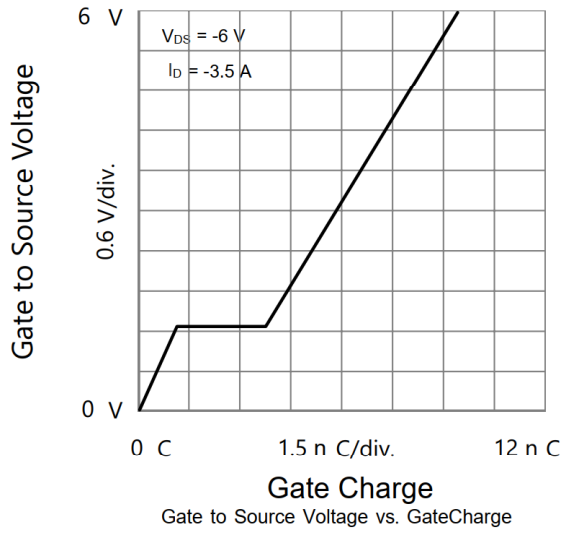


Source to Drain Voltage Body Diode Forward Characteristics

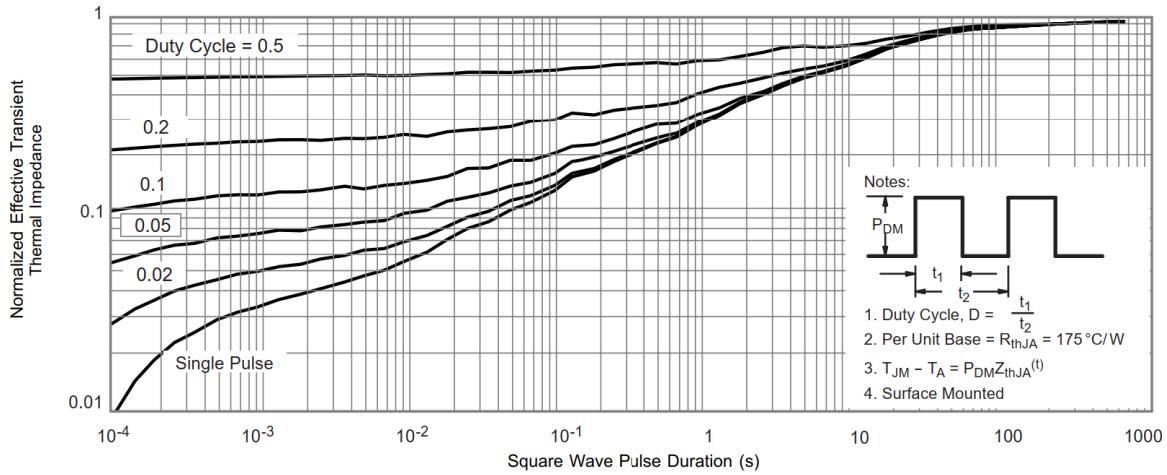


Drain to Source Voltage Capacitances

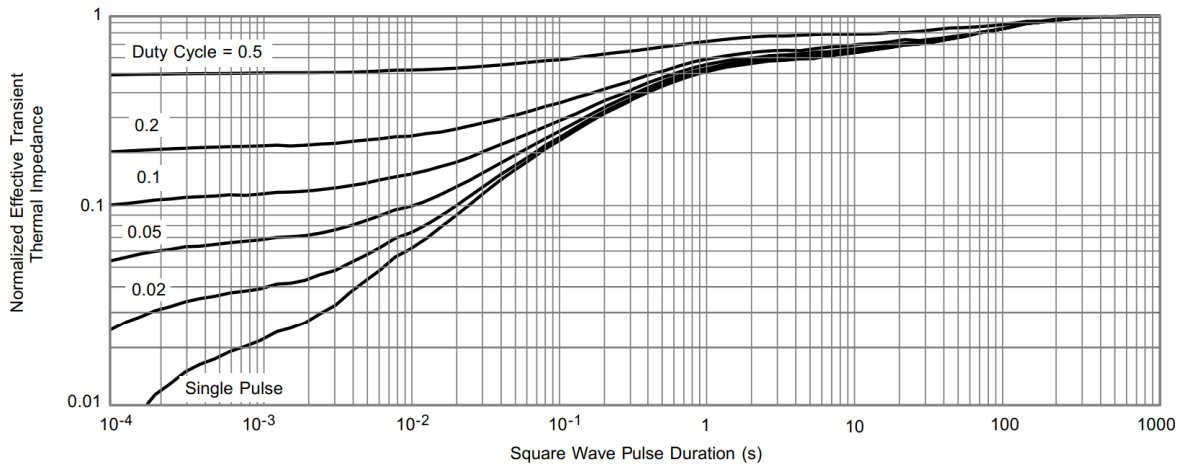
TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)



THERMAL RATINGS ($T_A = 25\text{ }^\circ\text{C}$, unless otherwise noted)



Normalized Thermal Transient Impedance, Junction-to-Foot

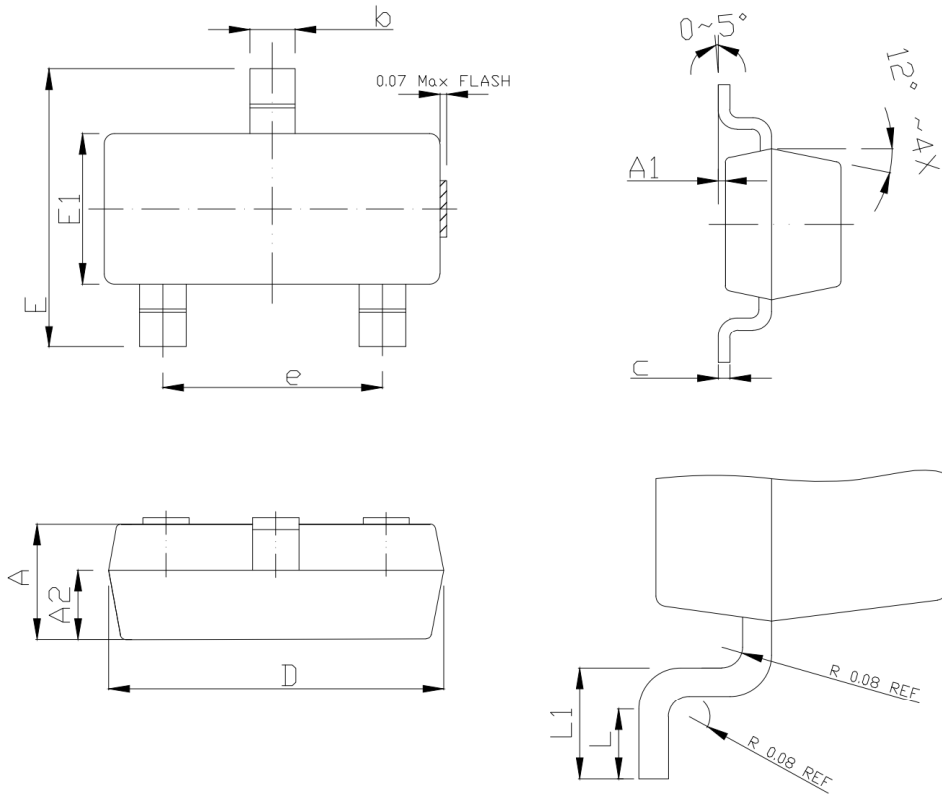


Normalized Thermal Transient Impedance, Junction-to-Ambient

Note

- The characteristics shown in the two graphs
 - Normalized Transient Thermal Impedance Junction-to-Ambient ($25\text{ }^\circ\text{C}$)
 - Normalized Transient Thermal Impedance Junction-to-Foot ($25\text{ }^\circ\text{C}$)
 are given for general guidelines only to enable the user to get a "ball park" indication of part capabilities. The data are extracted from single pulse transient thermal impedance characteristics which are developed from empirical measurements. The latter is valid for the part mounted on printed circuit board - FR4, size 1" x 1" x 0.062", double sided with 2 oz. copper, 100 % on both sides. The part capabilities can widely vary depending on actual application parameters and operating conditions.

SOT-23 PACKAGE OUTLINE



COMMON DIMENSIONS
(UNITS OF MEASURE=MILLIMETER)

| SYMBOL | MILLIMETER | | |
|--------|------------|------|------|
| | MIN | NOM | MAX |
| A | 0.80 | 1.00 | 1.30 |
| A1 | 0.00 | 0.05 | 0.15 |
| b | 0.25 | 0.40 | 0.55 |
| c | 0.11 BSC | | |
| D | 2.60 | 2.90 | 3.20 |
| E | 2.10 | 2.40 | 2.70 |
| E1 | 1.10 | 1.30 | 1.48 |
| e | 1.90 BSC | | |
| L | 0.17 | - | - |
| L1 | 0.28 | 0.40 | 0.53 |
| A2 | 0.60 REF | | |

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