

RoHS Compliant Product  
A suffix of "-C" specifies halogen and lead-free

## DESCRIPTION

These miniature surface mount MOSFETs utilize a high cell density trench process to provide low  $R_{DS(on)}$  and to ensure minimal power loss and heat dissipation.

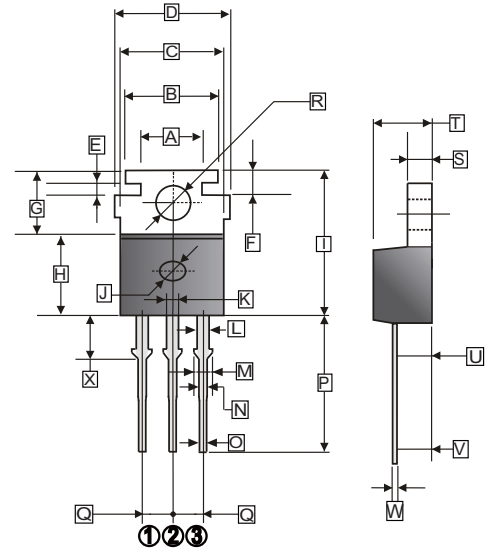
## FEATURES

- Low  $R_{DS(on)}$  provides higher efficiency and extends battery life.
- Low thermal impedance copper leadframe TO-220P saves board space.
- Fast Switch Speed.
- High performance trench technology.

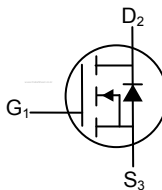
## APPLICATION

DC-DC converters and power management in portable and battery-powered products such as computers, printers, PCMCIA cards, cellular and cordless telephones.

## TO-220P



## N-Channel



| REF. | Millimeter |       | REF. | Millimeter |       |
|------|------------|-------|------|------------|-------|
|      | Min.       | Max.  |      | Min.       | Max.  |
| A    | 7.90       | 8.10  | M    | -          | 1.50  |
| B    | 9.45       | 9.65  | N    | 0.75       | 0.95  |
| C    | 9.87       | 10.47 | O    | 0.66       | 0.86  |
| D    | -          | 11.50 | P    | 13.50      | 14.50 |
| E    | 1.06       | 1.46  | Q    | 2.44       | 3.44  |
| F    | 2.60       | 3.00  | R    | 3.50       | 3.70  |
| G    | 6.30       | 6.70  | S    | 1.15       | 1.45  |
| H    | 8.35       | 8.75  | T    | 4.30       | 4.70  |
| I    | 14.7       | 15.3  | U    | -          | 2.7   |
| J    | 1.60 Typ.  |       | V    | 1.89       | 3.09  |
| K    | 1.10       | 1.30  | W    | 0.40       | 0.60  |
| L    | 1.17       | 1.37  | X    | 2.60       | 3.60  |

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

| Parameter                                                 | Symbol          | Ratings  | Unit                        |
|-----------------------------------------------------------|-----------------|----------|-----------------------------|
| Drain-Source Voltage                                      | $V_{DS}$        | 100      | V                           |
| Gate-Source Voltage                                       | $V_{GS}$        | $\pm 20$ | V                           |
| Continuous Drain Current <sup>1</sup>                     | $I_D$           | 90       | A                           |
| Pulsed Drain Current <sup>2</sup>                         | $I_{DM}$        | 240      | A                           |
| Continuous Source Current (Diode Conduction) <sup>1</sup> | $I_S$           | 90       | A                           |
| Power Dissipation <sup>1</sup>                            | $P_D$           | 300      | W                           |
| Operating Junction and Storage Temperature Range          | $T_J, T_{STG}$  | -55~175  | $^\circ\text{C}$            |
| <b>Thermal Resistance Rating</b>                          |                 |          |                             |
| Maximum Junction to Ambient <sup>1</sup>                  | $R_{\theta JA}$ | 62.5     | $^\circ\text{C} / \text{W}$ |
| Maximum Junction to Case                                  | $R_{\theta JC}$ | 0.5      |                             |

Notes:

- 1 Package Limited.
- 2 Pulse width limited by maximum junction temperature.

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

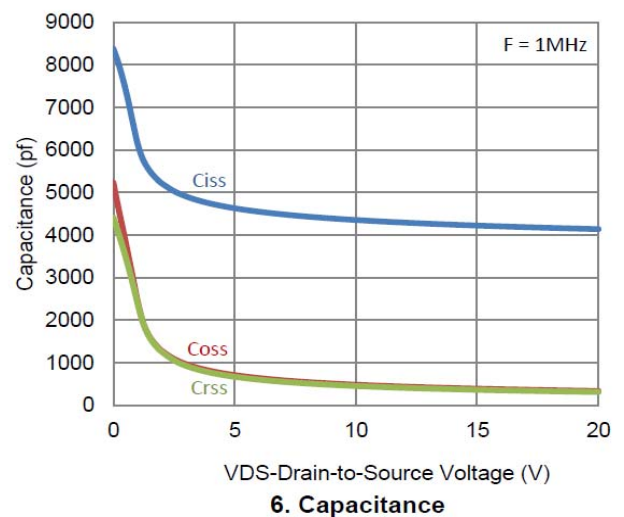
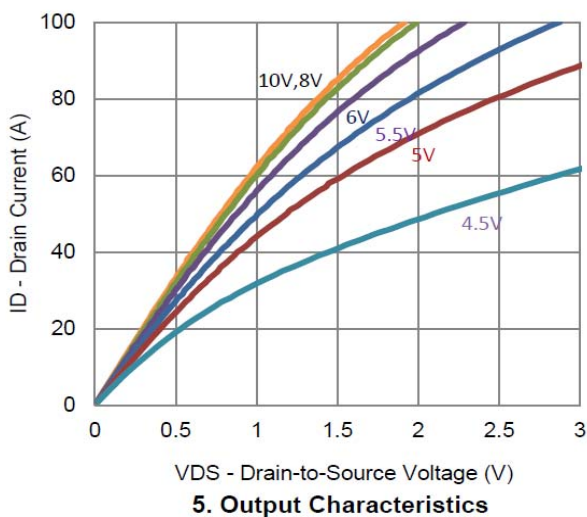
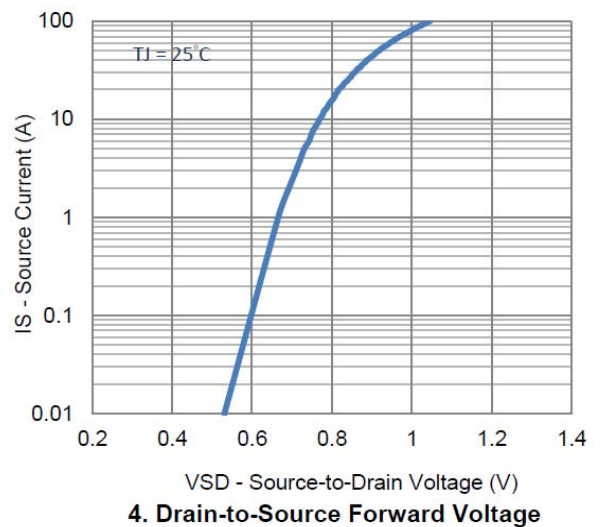
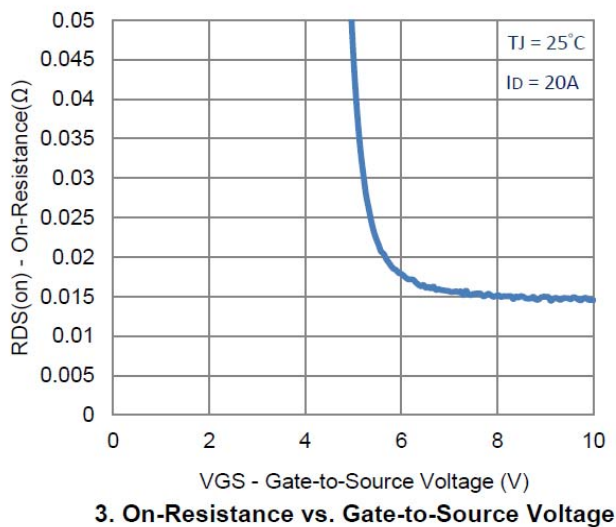
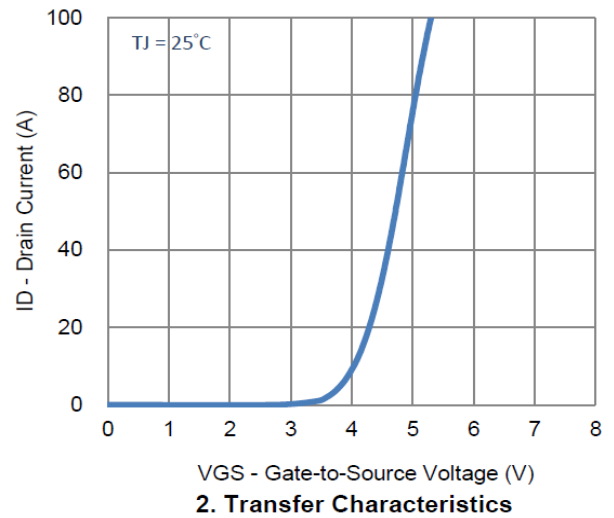
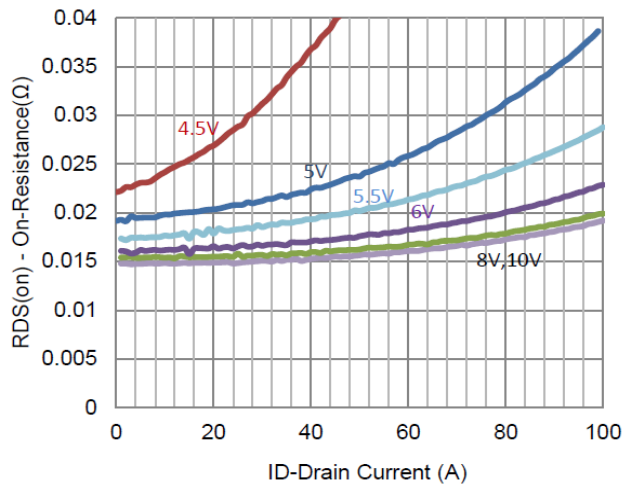
| Parameter                               | Symbol       | Min. | Typ. | Max.      | Unit          | Test Conditions                                                                                                 |
|-----------------------------------------|--------------|------|------|-----------|---------------|-----------------------------------------------------------------------------------------------------------------|
| <b>Static</b>                           |              |      |      |           |               |                                                                                                                 |
| Gate-Threshold Voltage                  | $V_{GS(th)}$ | 1    | -    | -         | V             | $V_{DS}=V_{GS}$ , $I_D=250\mu\text{A}$                                                                          |
| Gate-Body Leakage                       | $I_{GSS}$    | -    | -    | $\pm 100$ | nA            | $V_{DS}=0$ , $V_{GS}=\pm 25\text{V}$                                                                            |
| Zero Gate Voltage Drain Current         | $I_{DSS}$    | -    | -    | 1         | $\mu\text{A}$ | $V_{DS}=80\text{V}$ , $V_{GS}=0$                                                                                |
|                                         |              | -    | -    | 25        |               | $V_{DS}=80\text{V}$ , $V_{GS}=0$ , $T_J=55^\circ\text{C}$                                                       |
| On-State Drain Current <sup>1</sup>     | $I_{D(on)}$  | 180  | -    | -         | A             | $V_{DS}=5\text{V}$ , $V_{GS}=10\text{V}$                                                                        |
| Drain-Source On-Resistance <sup>1</sup> | $R_{DS(ON)}$ | -    | -    | 16        | m $\Omega$    | $V_{GS}=10\text{V}$ , $I_D=30\text{A}$                                                                          |
|                                         |              | -    | -    | 19        |               | $V_{GS}=5.5\text{V}$ , $I_D=20\text{A}$                                                                         |
| Forward Transconductance <sup>1</sup>   | $g_{fs}$     | -    | 40   | -         | S             | $V_{DS}=15\text{V}$ , $I_D=20\text{A}$                                                                          |
| Diode Forward Voltage                   | $V_{SD}$     | -    | 0.9  | -         | V             | $I_S=45\text{A}$ , $V_{GS}=0$                                                                                   |
| <b>Dynamic <sup>2</sup></b>             |              |      |      |           |               |                                                                                                                 |
| Input Capacitance                       | $C_{iss}$    | -    | 4221 | -         | pF            | $V_{DS}=15\text{V}$ ,<br>$V_{GS}=0$ ,<br>$f=1\text{ MHz}$                                                       |
| Output Capacitance                      | $C_{oss}$    | -    | 392  | -         |               |                                                                                                                 |
| Reverse Transfer Capacitance            | $C_{rss}$    | -    | 364  | -         |               |                                                                                                                 |
| Total Gate Charge                       | $Q_g$        | -    | 60   | -         | nC            | $V_{DS}=50\text{V}$ ,<br>$V_{GS}=5.5\text{V}$ ,<br>$I_D=20\text{A}$                                             |
| Gate-Source Charge                      | $Q_{gs}$     | -    | 19   | -         |               |                                                                                                                 |
| Gate-Drain Charge                       | $Q_{gd}$     | -    | 39   | -         |               |                                                                                                                 |
| Turn-on Delay Time                      | $T_{d(on)}$  | -    | 25   | -         | nS            | $V_{DS}=50\text{V}$ ,<br>$V_{GEN}=10\text{V}$ ,<br>$R_L=2.5\Omega$ ,<br>$I_D=20\text{A}$ ,<br>$R_{GEN}=6\Omega$ |
| Rise Time                               | $T_r$        | -    | 49   | -         |               |                                                                                                                 |
| Turn-off Delay Time                     | $T_{d(off)}$ | -    | 111  | -         |               |                                                                                                                 |
| Fall Time                               | $T_f$        | -    | 44   | -         |               |                                                                                                                 |

Notes:

1 Pulse test :  $PW \leq 300\mu\text{s}$  duty cycle  $\leq 2\%$ .

2 Guaranteed by design, not subject to production testing.

## CHARACTERISTIC CURVES



## CHARACTERISTIC CURVES

