

COM140T COM340T
COM240T COM440T

(COTS) COMMERCIAL OFF-THE-SHELF POWER MOSFETS IN TO-257AA PACKAGE



FEATURES

- Isolated Hermetic Metal Package
- Fast Switching
- Low $R_{DS(on)}$

DESCRIPTION

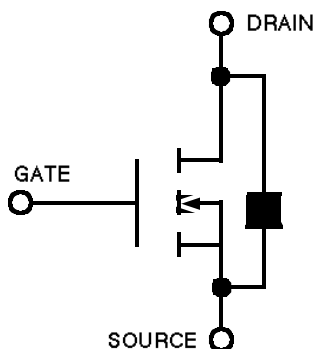
This series of hermetically packaged products feature the latest advanced MOS-FET and packaging technology. They are ideally suited for Military requirements where small size, high performance and high reliability are required, and in applications such as switching power supplies, motor controls, inverters, choppers, audio amplifiers and high energy pulse circuits.

MAXIMUM RATINGS @ 25°C

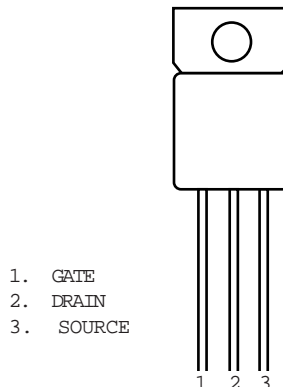
| PART NUMBER | V_{DS} | $R_{DS(on)}$ | $I_D(MAX)$ |
|-------------|----------|--------------|------------|
| COM140T | 100V | .12 | 14A |
| COM240T | 200V | .21 | 14A |
| COM340T | 400V | .59 | 10A |
| COM440T | 500V | .90 | 7A |

3.1

SCHEMATIC



CONNECTION DIAGRAM



ELECTRICAL CHARACTERISTICS: $T_C = 25^\circ$ unless otherwise noted
STATIC P/N COM140T

ELECTRICAL CHARACTERISTICS: $T_C = 25^\circ$ unless otherwise noted
STATIC P/N COM240T

| Parameter | Min. | Typ. | Max. | Units | Test Conditions |
|---|------|------------|-------------|-------|---|
| BV_{DSS} Drain-Source Breakdown Voltage | 100 | | | V | $V_{GS} = 0,$ $I_D = 250$ mA |
| $V_{GS(th)}$ Gate-Threshold Voltage | 2.0 | | 4.0 | V | $V_{DS} = V_{GS}, I_D = 250$ mA |
| I_{GSSF} Gate-Body Leakage Forward | | | 100 | nA | $V_{GS} = 20$ V |
| I_{GSSR} Gate-Body Leakage Reverse | | | -100 | nA | $V_{GS} = -20$ V |
| I_{GSS} Zero Gate Voltage Drain Current | | 0.1 0.2 | 0.25 1.0 | mA | $V_{DS} = \text{Max. Rat.}, V_{GS} = 0$ $V_{DS} = 0.8 \text{ Max. Rat.}, V_{GS} = 0,$ $T_C = 125^\circ$ C |
| $I_{D(on)}$ On-State Drain Current ¹ | 14 | | | A | $V_{DS} = 2 V_{DS(on)}, V_{GS} = 10$ V |
| $V_{DS(on)}$ Static Drain-Source On-State Voltage ¹ | | 1.40 | 1.73 | V | $V_{GS} = 10$ V, $I_D = 15$ A |
| $R_{DS(on)}$ Static Drain-Source On-State Resistance ¹ | | | .12 | | $V_{GS} = 10$ V, $I_D = 15$ A |
| $R_{DS(on)}$ Static Drain-Source On-State Resistance ¹ | | | .22 | | $V_{GS} = 10$ V, $I_D = 15$ A, $T_C = 125$ C |

| Parameter | Min. | Typ. | Max. | Units | Test Conditions |
|---|------|------------|-------------|-------|---|
| BV_{DSS} Drain-Source Breakdown Voltage | 200 | | | V | $V_{GS} = 0,$ $I_D = 250$ mA |
| $V_{GS(th)}$ Gate-Threshold Voltage | 2.0 | | 4.0 | V | $V_{DS} = V_{GS}, I_D = 250$ mA |
| I_{GSSF} Gate-Body Leakage Forward | | | 100 | nA | $V_{GS} = 20$ V |
| I_{GSSR} Gate-Body Leakage Reverse | | | -100 | nA | $V_{GS} = -20$ V |
| I_{GSS} Zero Gate Voltage Drain Current | | 0.1 0.2 | 0.25 1.0 | mA | $V_{DS} = \text{Max. Rat.}, V_{GS} = 0$ $V_{DS} = 0.8 \text{ Max. Rat.}, V_{GS} = 0,$ $T_C = 125^\circ$ C |
| $I_{D(on)}$ On-State Drain Current ¹ | 14 | | | A | $V_{DS} = 2 V_{DS(on)}, V_{GS} = 10$ V |
| $V_{DS(on)}$ Static Drain-Source On-State Voltage ¹ | | 1.8 | 2.1 | V | $V_{GS} = 10$ V, $I_D = 10$ A |
| $R_{DS(on)}$ Static Drain-Source On-State Resistance ¹ | | | 0.21 | | $V_{GS} = 10$ V, $I_D = 10$ A |
| $R_{DS(on)}$ Static Drain-Source On-State Resistance ¹ | | | 0.41 | | $V_{GS} = 10$ V, $I_D = 10$ A, $T_C = 125$ C |

DYNAMIC

DYNAMIC

| Parameter | Min. | Typ. | Max. | Units | Test Conditions |
|---|------|------|------|-------|--|
| g_B Forward Transconductance ¹ | 10 | | | S (M) | $V_{DS} = 2 V_{DS(on)}, I_D = 15$ A |
| C_{iss} Input Capacitance | | 1275 | | pF | $V_{GS} = 0$ |
| C_{oss} Output Capacitance | | 550 | | pF | $V_{DS} = 25$ V |
| C_{rss} Reverse Transfer Capacitance | | 160 | | pF | $f = 1$ MHz |
| $T_{d(on)}$ Turn-On Delay Time | | 16 | | ns | $V_{DD} = 30$ V, $I_D @ 5$ A |
| t_r Rise Time | | 19 | | ns | $R_g = 5$ W, $V_{GS} = 10$ V |
| $T_{d(off)}$ Turn-Off Delay Time | | 42 | | ns | (MOSFET) switching times are essentially independent of operating temperature. |
| t_f Fall Time | | 24 | | ns | |

| Parameter | Min. | Typ. | Max. | Units | Test Conditions |
|---|------|------|------|-------|--|
| g_B Forward Transconductance ¹ | 6.0 | | | S (M) | $V_{DS} = 2 V_{DS(on)}, I_D = 10$ A |
| C_{iss} Input Capacitance | | 1000 | | pF | $V_{GS} = 0$ |
| C_{oss} Output Capacitance | | 250 | | pF | $V_{DS} = 25$ V |
| C_{rss} Reverse Transfer Capacitance | | 100 | | pF | $f = 1$ MHz |
| $T_{d(on)}$ Turn-On Delay Time | | 17 | | ns | $V_{DD} = 75$ V, $I_D @ 18$ A |
| t_r Rise Time | | 52 | | ns | $R_g = 5$ W, $V_{GS} = 10$ V |
| $T_{d(off)}$ Turn-Off Delay Time | | 36 | | ns | (MOSFET) switching times are essentially independent of operating temperature. |
| t_f Fall Time | | 30 | | ns | |

BODY-DRAIN DIODE RATINGS AND CHARACTERISTICS

BODY-DRAIN DIODE RATINGS AND CHARACTERISTICS

| Parameter | Min. | Typ. | Max. | Units | Test Conditions |
|---|------|------|------|-------|---|
| I_S Continuous Source Current (Body Diode) | | | -27 | A | Modified MOSPOWER symbol showing the integral P-N Junction rectifier. |
| I_{SM} Source Current ¹ (Body Diode) | | | -108 | A | |
| V_{SD} Diode Forward Voltage ¹ | | | -2.0 | V | $T_C = 25$ C, $I_S = -24$ A, $V_{GS} = 0$ |
| t_r Reverse Recovery Time | | 200 | | ns | $T_J = 150$ C, $I_F = I_S,$ $d_f/ds = 100$ A/ms |

| Parameter | Min. | Typ. | Max. | Units | Test Conditions |
|---|------|------|------|-------|---|
| I_S Continuous Source Current (Body Diode) | | | -18 | A | Modified MOSPOWER symbol showing the integral P-N Junction rectifier. |
| I_{SM} Source Current ¹ (Body Diode) | | | -72 | A | |
| V_{SD} Diode Forward Voltage ¹ | | | -1.5 | V | $T_C = 25$ C, $I_S = -18$ A, $V_{GS} = 0$ |
| t_r Reverse Recovery Time | | 350 | | ns | $T_J = 150$ C, $I_F = I_S,$ $d_f/ds = 100$ A/ms |

¹ Pulse Test: Pulse Width 300msec, Duty Cycle 2%.

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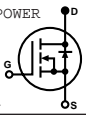
ELECTRICAL CHARACTERISTICS: $T_C = 25^\circ$ unless otherwise noted
 STATIC P/N COM340T

| Parameter | Min. | Typ. | Max. | Units | Test Conditions |
|---|------|------------|-------------|-------|--|
| BV_{DSS} Drain-Source Breakdown Voltage | 400 | | | V | $V_{GS} = 0$, $I_D = 250$ mA |
| $V_{GS(th)}$ Gate-Threshold Voltage | 2.0 | | 4.0 | V | $V_{DS} = V_{GS}$, $I_D = 250$ mA |
| I_{SSF} Gate-Body Leakage Forward | | | 100 | nA | $V_{GS} = 20$ V |
| I_{SSR} Gate-Body Leakage Reverse | | | -100 | nA | $V_{GS} = -20$ V |
| I_{SS} Zero Gate Voltage Drain Current | | 0.1 0.2 | 0.25 1.0 | m A | $V_{DS} = \text{Max. Rat.}$, $V_{GS} = 0$ $V_{DS} = 0.8 \text{ Max. Rat.}$, $V_{GS} = 0$, $T_C = 125^\circ$ C |
| $I_{D(on)}$ On-State Drain Current ¹ | 10 | | | A | $V_{DS} = 2 V_{DS(on)}$, $V_{GS} = 10$ V |
| $V_{DS(on)}$ Static Drain-Source On-State Voltage ¹ | | 2.5 | 2.9 | V | $V_{GS} = 10$ V, $I_D = 5$ A |
| $R_{DS(on)}$ Static Drain-Source On-State Resistance ¹ | | | 0.59 | | $V_{GS} = 10$ V, $I_D = 5$ A |
| $R_{DS(on)}$ Static Drain-Source On-State Resistance ¹ | | | 1.2 | | $V_{GS} = 10$ V, $I_D = 5$ A, $T_C = 125$ C |

DYNAMIC

| | | | | | |
|---|-----|------|--|------|---------------------------------------|
| g_b Forward Transconductance ¹ | 4.0 | 4.4 | | S(M) | $V_{DS} = 2 V_{DS(on)}$, $I_D = 5$ A |
| C_{iss} Input Capacitance | | 1150 | | pF | $V_{GS} = 0$ |
| C_{oss} Output Capacitance | | 165 | | pF | $V_{DS} = 25$ V |
| C_{iss} Reverse Transfer Capacitance | | 70 | | pF | $f = 1$ MHz |
| $T_{d(on)}$ Turn-On Delay Time | | 17 | | ns | $V_{DD} = 175$ V, $I_D = 5$ A |
| t_r Rise Time | | 12 | | ns | $R_g = 5$ W, $V_{DS} = 10$ V |
| $T_{d(off)}$ Turn-Off Delay Time | | 45 | | ns | |
| t_f Fall Time | | 30 | | ns | |

BODY-DRAIN DIODE RATINGS AND CHARACTERISTICS

| | | | | | |
|---|--|-----|-----|----|--|
| I_S Continuous Source Current (Body Diode) | | | -10 | A | Modified MOSPOWER symbol showing the integral P-N Junction rectifier.  |
| I_{SM} Source Current ¹ (Body Diode) | | | -40 | A | |
| V_{SD} Diode Forward Voltage ¹ | | | -2 | V | $T_C = 25$ C, $I_S = -10$ A, $V_{GS} = 0$ |
| t_r Reverse Recovery Time | | 530 | | ns | $T_J = 150$ C, $I_F = I_S$, $d_F/ds = 100$ A/ms |

¹ Pulse Test: Pulse Width 300msec, Duty Cycle 2%.

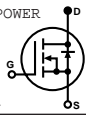
ELECTRICAL CHARACTERISTICS: $T_C = 25^\circ$ unless otherwise noted
 STATIC P/N COM440T

| Parameter | Min. | Typ. | Max. | Units | Test Conditions |
|---|------|------------|-------------|-------|--|
| BV_{DSS} Drain-Source Breakdown Voltage | 500 | | | V | $V_{GS} = 0$, $I_D = 250$ mA |
| $V_{GS(th)}$ Gate-Threshold Voltage | 2.0 | | 4.0 | V | $V_{DS} = V_{GS}$, $I_D = 250$ mA |
| I_{SSF} Gate-Body Leakage Forward | | | 100 | nA | $V_{GS} = 20$ V |
| I_{SSR} Gate-Body Leakage Reverse | | | -100 | nA | $V_{GS} = -20$ V |
| I_{SS} Zero Gate Voltage Drain Current | | 0.1 0.2 | 0.25 1.0 | m A | $V_{DS} = \text{Max. Rat.}$, $V_{GS} = 0$ $V_{DS} = 0.8 \text{ Max. Rat.}$, $V_{GS} = 0$, $T_C = 125^\circ$ C |
| $I_{D(on)}$ On-State Drain Current ¹ | 4.5 | | | A | $V_{DS} = 2 V_{DS(on)}$, $V_{GS} = 10$ V |
| $V_{DS(on)}$ Static Drain-Source On-State Voltage ¹ | | 3.2 | 3.52 | V | $V_{GS} = 10$ V, $I_D = 4$ A |
| $R_{DS(on)}$ Static Drain-Source On-State Resistance ¹ | | | 0.90 | | $V_{GS} = 10$ V, $I_D = 4$ A |
| $R_{DS(on)}$ Static Drain-Source On-State Resistance ¹ | | | 1.8 | | $V_{GS} = 10$ V, $I_D = 4$ A, $T_C = 125$ C |

DYNAMIC

| | | | | | |
|---|-----|------|--|------|--|
| g_b Forward Transconductance ¹ | 4.0 | 4.8 | | S(M) | $V_{DS} = 2 V_{DS(on)}$, $I_D = 4$ A |
| C_{iss} Input Capacitance | | 1225 | | pF | $V_{GS} = 0$ |
| C_{oss} Output Capacitance | | 200 | | pF | $V_{DS} = 25$ V |
| C_{iss} Reverse Transfer Capacitance | | 85 | | pF | $f = 1$ MHz |
| $T_{d(on)}$ Turn-On Delay Time | | 17 | | ns | $V_{DD} = 200$ V, $I_D = 4$ A |
| t_r Rise Time | | 5 | | ns | $R_g = 5$ W, $V_{DS} = 10$ V |
| $T_{d(off)}$ Turn-Off Delay Time | | 42 | | ns | (MOSFET) switching times are essentially independent of operating temperature. |
| t_f Fall Time | | 14 | | ns | |

BODY-DRAIN DIODE RATINGS AND CHARACTERISTICS

| | | | | | |
|---|--|-----|-----|----|--|
| I_S Continuous Source Current (Body Diode) | | | -8 | A | Modified MOSPOWER symbol showing the integral P-N Junction rectifier.  |
| I_{SM} Source Current ¹ (Body Diode) | | | -32 | A | |
| V_{SD} Diode Forward Voltage ¹ | | | -2 | V | $T_C = 25$ C, $I_S = -18$ A, $V_{GS} = 0$ |
| t_r Reverse Recovery Time | | 700 | | ns | $T_J = 150$ C, $I_F = I_S$, $d_F/ds = 100$ A/ms |

¹ Pulse Test: Pulse Width 300msec, Duty Cycle 2%.

COM140T - COM440T

ABSOLUTE MAXIMUM RATINGS ($T_C = 25^\circ\text{C}$ unless otherwise noted)

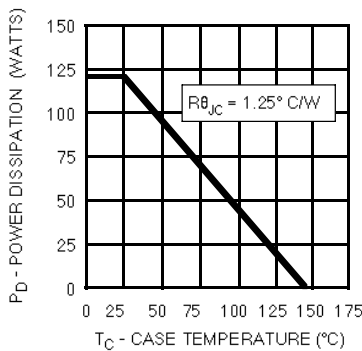
| Parameter | COM140T | COM240T | COM340T | COM440T | Units |
|---|------------|------------|------------|------------|---------------------|
| V_{DS} Drain-Source Voltage | 100 | 200 | 400 | 500 | V |
| V_{DGR} Drain-Gate Voltage ($R_{GS} = 1\text{ M}$) | 100 | 200 | 400 | 500 | V |
| $I_D @ T_C = 25^\circ\text{C}$ Continuous Drain Current ² | ± 14 | ± 14 | ± 10 | ± 8 | A |
| $I_D @ T_C = 100^\circ\text{C}$ Continuous Drain Current ² | ± 14 | ± 11 | ± 6 | ± 5 | A |
| I_{DM} Pulsed Drain Current ¹ | ± 56 | ± 56 | ± 40 | ± 32 | A |
| V_{GS} Gate-Source Voltage | ± 20 | ± 20 | ± 20 | ± 20 | V |
| $P_D @ T_C = 25^\circ\text{C}$ Maximum Power Dissipation | 125 | 125 | 125 | 125 | W |
| $P_D @ T_C = 100^\circ\text{C}$ Maximum Power Dissipation | 50 | 50 | 50 | 50 | W |
| Junction To Case Linear Derating Factor | 1.0 | 1.0 | 1.0 | 1.0 | W/ $^\circ\text{C}$ |
| Junction To Ambient Linear Derating Factor | .015 | .015 | .015 | .015 | W/ $^\circ\text{C}$ |
| T_J Operating and | | | | | |
| T_{stg} Storage Temperature Range | -55 to 150 | -55 to 150 | -55 to 150 | -55 to 150 | $^\circ\text{C}$ |
| Lead Temperature (1/16" from case for 10 secs.) | 300 | 300 | 300 | 300 | $^\circ\text{C}$ |

- 1 Pulse Test: Pulse width 300 μsec . Duty Cycle 2%.
- 2 Package pin limitation = 10 Amps

THERMAL RESISTANCE

| | | | |
|--------------------------------|------|--------------------|--------------------|
| R_{thJC} Junction-to-Case | 1.00 | $^\circ\text{C/W}$ | |
| R_{thJA} Junction-to-Ambient | 65 | $^\circ\text{C/W}$ | Free Air Operation |

POWER DERATING



MECHANICAL OUTLINE

TO-257

