

### Product Summary

| $V_{(BR)DSS}$ | $R_{DS(on)TYP}$ | $I_D$ |
|---------------|-----------------|-------|
| -60V          | 20mΩ@-10V       | -50A  |
|               | 26mΩ@-4.5V      |       |

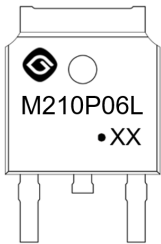
### Feature

- Trench Technology Power MOSFET
- Low  $R_{DS(ON)}$
- Low Gate Charge
- Low Gate Resistance
- 100% UIS Tested

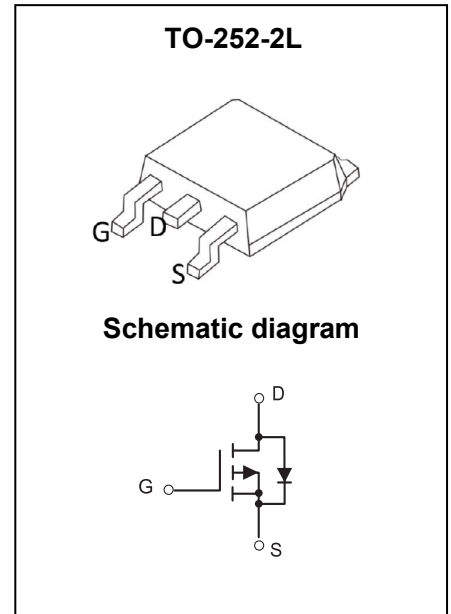
### Application

- Power Switching Application

### MARKING:



M210P06L = Device Code  
 XX = Date Code  
 Solid Dot = Green Indicator



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

| Parameter  | Symbol          | Value                     | Unit               |
|--|-----------------|---------------------------|--------------------|
| Drain - Source Voltage                                   | $V_{DS}$        | -60                       | V                  |
| Gate - Source Voltage                                    | $V_{GS}$        | ±20                       | V                  |
| Continuous Drain Current <sup>1</sup>                    | $I_D$           | $T_C = 25^\circ\text{C}$  | -50                |
|  |                 | $T_C = 100^\circ\text{C}$ | 32                 |
| Pulsed Drain Current <sup>2</sup>                        | $I_{DM}$        | -200                      | A                  |
| Single Pulsed Avalanche Current <sup>3</sup>             | $I_{AS}$        | -19                       | A                  |
| Single Pulsed Avalanche Energy <sup>3</sup>              | $E_{AS}$        | 98                        | mJ                 |
| Power Dissipation <sup>5</sup>                           | $P_D$           | 78                        | W                  |
| Thermal Resistance from Junction to Ambient <sup>6</sup> | $R_{\theta JA}$ | 52                        | $^\circ\text{C/W}$ |
| Thermal Resistance from Junction to Case                 | $R_{\theta JC}$ | 1.6                       | $^\circ\text{C/W}$ |
| Junction Temperature                                     | $T_J$           | 150                       | $^\circ\text{C}$   |
| Storage Temperature                                      | $T_{STG}$       | -55~ +150                 | $^\circ\text{C}$   |

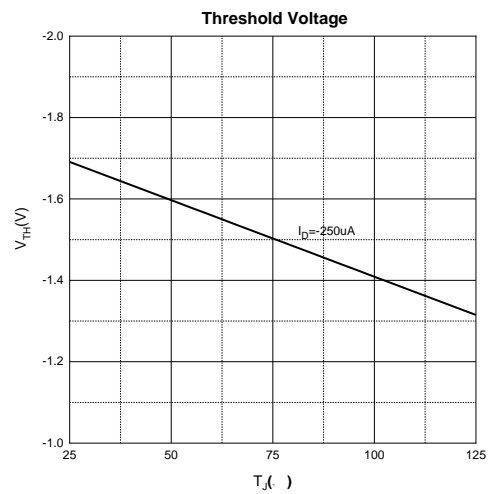
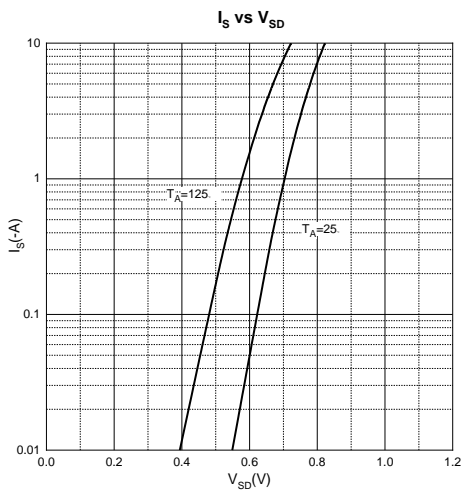
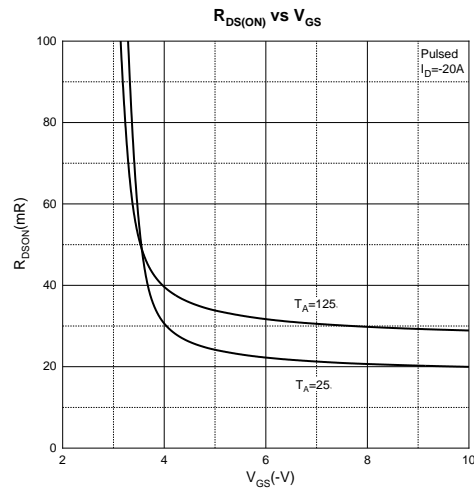
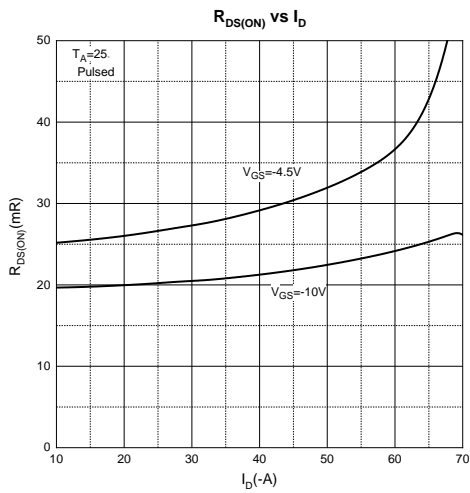
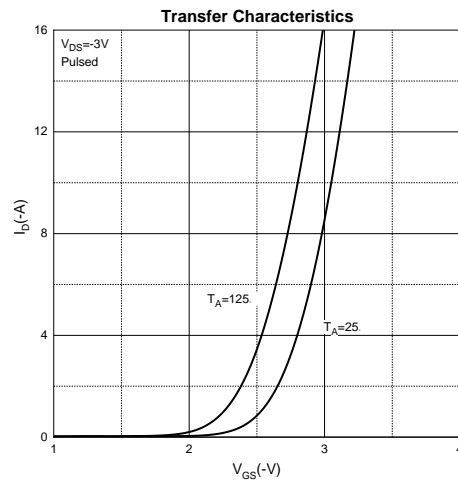
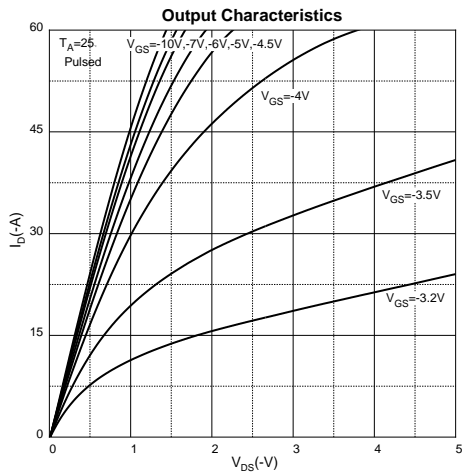
## MOSFET ELECTRICAL CHARACTERISTICS ( $T_J = 25^\circ\text{C}$ unless otherwise noted)

| Parameter                                   | Symbol        | Test Condition   | Min  | Type | Max       | Unit       |
|---|---------------|--|------|------|-----------|------------|
| <b>Off Characteristics</b>                  |               |  |      |      |           |            |
| Drain - Source Breakdown Voltage            | $V_{(BR)DSS}$ | $V_{GS} = 0V, I_D = -250\mu A$                                 | -60  |      |           | V          |
| Zero Gate Voltage Drain Current             | $I_{DSS}$     | $V_{DS} = -60V, V_{GS} = 0V$                                   |      |      | -1        | $\mu A$    |
| Gate - Body Leakage Current                 | $I_{GSS}$     | $V_{GS} = \pm 20V, V_{DS} = 0V$                                |      |      | $\pm 100$ | nA         |
| <b>On Characteristics<sup>4</sup></b>       |               |  |      |      |           |            |
| Gate Threshold Voltage                      | $V_{GS(th)}$  | $V_{DS} = V_{GS}, I_D = -250\mu A$                             | -1.0 | -1.5 | -3.0      | V          |
| Drain-source On-resistance                  | $R_{DS(on)}$  | $V_{GS} = -10V, I_D = -3A$                                     |      | 20   | 41        | m $\Omega$ |
|   |               | $V_{GS} = -4.5V, I_D = -3A$                                    |      | 26   | 51        |            |
| <b>Dynamic Characteristics</b>              |               |  |      |      |           |            |
| Input Capacitance                           | $C_{iss}$     | $V_{DS} = -30V, V_{GS} = 0V, f = 1MHz$                         |      | 2775 |           | pF         |
| Output Capacitance                          | $C_{oss}$     |  |      | 169  |           |            |
| Reverse Transfer Capacitance                | $C_{rss}$     |  |      | 142  |           |            |
| Gate Resistance                             | $R_g$         | $V_{DS} = 0V, V_{GS} = 0V, f = 1MHz$                           |      | 9.2  |           | $\Omega$   |
| <b>Switching Characteristics</b>            |               |  |      |      |           |            |
| Total Gate Charge                           | $Q_g$         | $V_{DS} = -15V, V_{GS} = -10V, I_D = -6.5A$                    |      | 54   |           | nC         |
| Gate-source Charge                          | $Q_{gs}$      |  |      | 6.9  |           |            |
| Gate-drain Charge                           | $Q_{gd}$      |  |      | 11.3 |           |            |
| Turn-on Delay Time                          | $t_{d(on)}$   | $V_{DD} = -20V, V_{GS} = -10V, R_L = 1.5\Omega, R_G = 3\Omega$ |      | 7    |           | ns         |
| Turn-on Rise Time                           | $t_r$         |  |      | 3    |           |            |
| Turn-off Delay Time                         | $t_{d(off)}$  |  |      | 32   |           |            |
| Turn-off Fall Time                          | $t_f$         |  |      | 6    |           |            |
| <b>Source - Drain Diode Characteristics</b> |               |  |      |      |           |            |
| Diode Forward Voltage <sup>4</sup>          | $V_{SD}$      | $V_{GS} = 0V, I_S = -2A$                                       |      |      | -1.2      | V          |

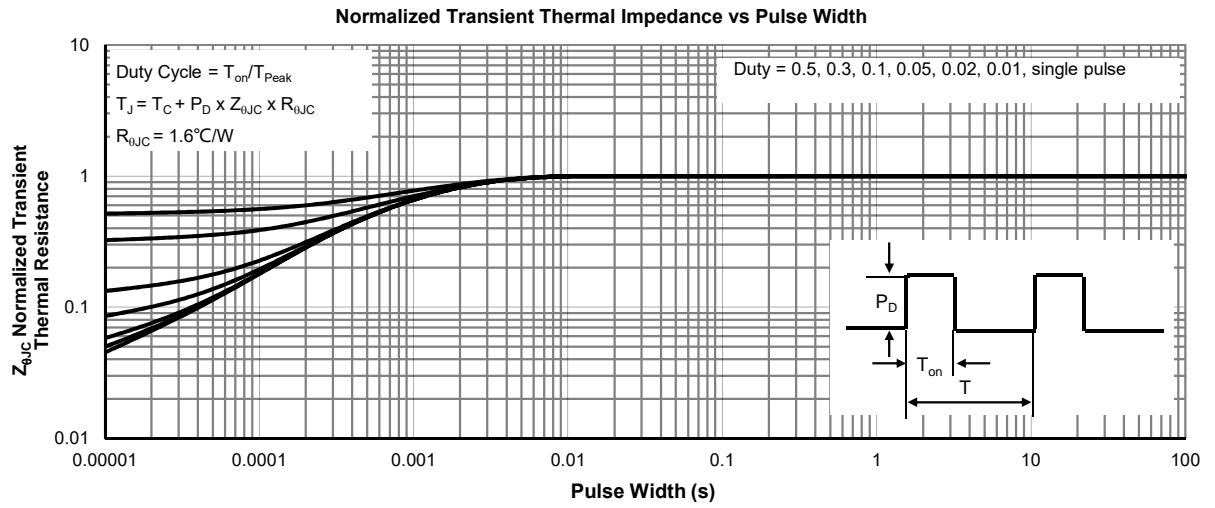
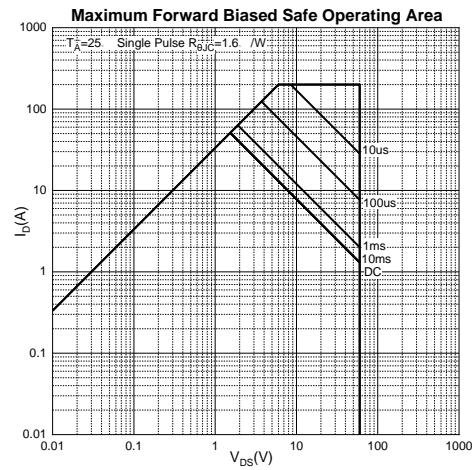
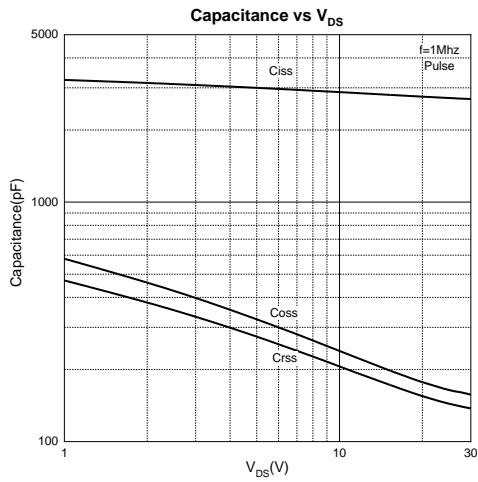
Notes :

- 1.The maximum current rating is limited by package.And device mounted on a large heatsink
- 2.Pulse Test : Pulse Width  $\leq 10\mu s$ , duty cycle  $\leq 1\%$ .
- 3.EAS condition:  $V_{DD} = -30V, V_{GS} = -10V, L = 0.5mH, R_G = 25\Omega$  Starting  $T_J = 25^\circ\text{C}$ .
- 4.Pulse Test : Pulse Width  $\leq 300\mu s$ , duty cycle  $\leq 2\%$ .
- 5.The power dissipation  $P_D$  is limited by  $T_{J(MAX)} = 150^\circ\text{C}$ .And device mounted on a large heatsink
- 6.Device mounted on  $1in^2$  FR-4 board with 2oz. Copper, in a still air environment with  $T_A = 25^\circ\text{C}$ .

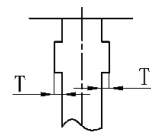
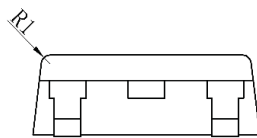
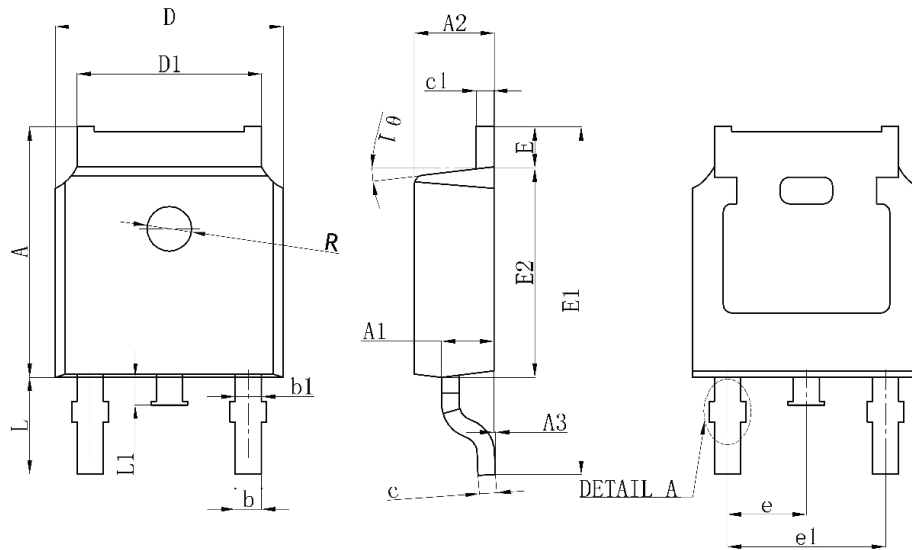
## Typical Characteristics



**Typical Characteristics**



## TO-252-2L Package Information



$$0 \leq T, T' \leq 0.12$$

DETAIL A

| Symbol   | Dimensions In Millimeters |        | Dimensions In Inches |       |
|----------|---------------------------|--------|----------------------|-------|
|          | Min.                      | Max.   | Min.                 | Max.  |
| A        | 7.050                     | 7.150  | 0.278                | 0.281 |
| A1       | 0.960                     | 1.060  | 0.038                | 0.042 |
| A2       | 2.200                     | 2.400  | 0.087                | 0.094 |
| A3       | 0.000                     | 0.100  | 0.000                | 0.004 |
| b        | 0.760REF                  |        | 0.030REF             |       |
| b1       | 1.000REF                  |        | 0.039REF             |       |
| c        | 0.508REF                  |        | 0.020REF             |       |
| c1       | 0.508REF                  |        | 0.020REF             |       |
| D        | 6.550                     | 6.650  | 0.258                | 0.262 |
| D1       | 5.100                     | 5.460  | 0.201                | 0.215 |
| E        | 0.950                     | 1.050  | 0.037                | 0.041 |
| E1       | 9.700                     | 10.400 | 0.382                | 0.409 |
| E2       | 6.000                     | 6.200  | 0.236                | 0.244 |
| e        | 2.286BSC                  |        | 0.090BSC             |       |
| e1       | 4.572REF                  |        | 0.180REF             |       |
| L        | 2.650                     | 2.950  | 0.104                | 0.116 |
| L1       | 0.700                     | 0.900  | 0.028                | 0.035 |
| $\theta$ | 7°REF                     |        | 7°REF                |       |
| R        | 1.300REF                  |        | 0.051REF             |       |
| R1       | 0.250REF                  |        | 0.010REF             |       |