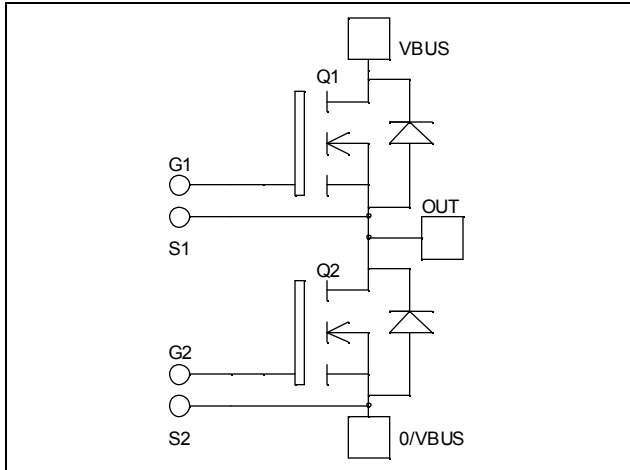


Phase leg MOSFET Power Module

$V_{DSS} = 1200V$
 $R_{DSon} = 150m\Omega \text{ typ @ } T_j = 25^\circ C$
 $I_D = 60A \text{ @ } T_c = 25^\circ C$



Application

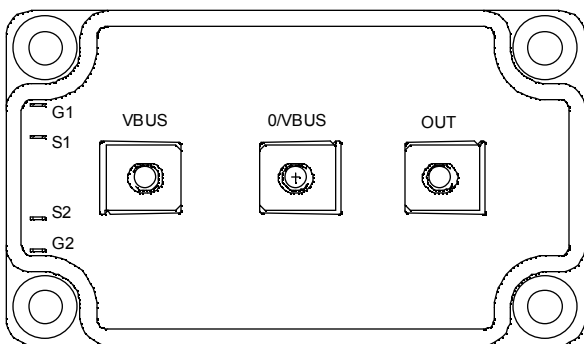
- Welding converters
- Switched Mode Power Supplies
- Uninterruptible Power Supplies
- Motor control

Features

- Power MOS 7[®] FREDFETs
 - Low R_{DSon}
 - Low input and Miller capacitance
 - Low gate charge
 - Fast intrinsic reverse diode
 - Avalanche energy rated
 - Very rugged
- Kelvin source for easy drive
- Very low stray inductance
 - Symmetrical design
 - M5 power connectors
- High level of integration

Benefits

- Outstanding performance at high frequency operation
- Direct mounting to heatsink (isolated package)
- Low junction to case thermal resistance
- Low profile
- RoHS Compliant



Absolute maximum ratings

| Symbol | Parameter | Max ratings | Unit |
|------------|---|--------------------|------------|
| V_{DSS} | Drain - Source Breakdown Voltage | 1200 | V |
| I_D | Continuous Drain Current | $T_c = 25^\circ C$ | 60 |
| | | $T_c = 80^\circ C$ | 45 |
| I_{DM} | Pulsed Drain current | 240 | A |
| V_{GS} | Gate - Source Voltage | ± 30 | V |
| R_{DSon} | Drain - Source ON Resistance | 175 | m Ω |
| P_D | Maximum Power Dissipation | $T_c = 25^\circ C$ | 1250 |
| I_{AR} | Avalanche current (repetitive and non repetitive) | 22 | A |
| E_{AR} | Repetitive Avalanche Energy | 50 | mJ |
| E_{AS} | Single Pulse Avalanche Energy | 3000 | |

CAUTION: These Devices are sensitive to Electrostatic Discharge. Proper Handling Procedures Should Be Followed. See application note APT0502 on www.microsemi.com

All ratings @ $T_j = 25^\circ\text{C}$ unless otherwise specified

Electrical Characteristics

| Symbol | Characteristic | Test Conditions | Min | Typ | Max | Unit |
|--------------|---------------------------------|---|---------------------------|-----|-----------|------------------|
| I_{DSS} | Zero Gate Voltage Drain Current | $V_{GS} = 0\text{V}, V_{DS} = 1200\text{V}$ | | | 500 | μA |
| | | $V_{GS} = 0\text{V}, V_{DS} = 1000\text{V}$ | $T_j = 125^\circ\text{C}$ | | 3000 | |
| $R_{DS(on)}$ | Drain – Source on Resistance | $V_{GS} = 10\text{V}, I_D = 30\text{A}$ | | 150 | 175 | $\text{m}\Omega$ |
| $V_{GS(th)}$ | Gate Threshold Voltage | $V_{GS} = V_{DS}, I_D = 10\text{mA}$ | 3 | | 5 | V |
| I_{GSS} | Gate – Source Leakage Current | $V_{GS} = \pm 30\text{V}, V_{DS} = 0\text{V}$ | | | ± 250 | nA |

Dynamic Characteristics

| Symbol | Characteristic | Test Conditions | Min | Typ | Max | Unit |
|--------------|------------------------------|---|-----|------|-----|------|
| C_{iss} | Input Capacitance | $V_{GS} = 0\text{V}$ | | 20.6 | | nF |
| C_{oss} | Output Capacitance | $V_{DS} = 25\text{V}$ | | 3.08 | | |
| C_{rss} | Reverse Transfer Capacitance | $f = 1\text{MHz}$ | | 0.52 | | |
| Q_g | Total gate Charge | $V_{GS} = 10\text{V}$ | | 748 | | nC |
| Q_{gs} | Gate – Source Charge | $V_{Bus} = 600\text{V}$ | | 96 | | |
| Q_{gd} | Gate – Drain Charge | $I_D = 60\text{A}$ | | 480 | | |
| $T_{d(on)}$ | Turn-on Delay Time | Inductive switching @ 125°C | | 20 | | ns |
| T_r | Rise Time | $V_{GS} = 15\text{V}$ | | 15 | | |
| $T_{d(off)}$ | Turn-off Delay Time | $V_{Bus} = 800\text{V}$ | | 160 | | |
| T_f | Fall Time | $I_D = 60\text{A}$ $R_G = 1.2\Omega$ | | 45 | | |
| E_{on} | Turn-on Switching Energy | Inductive switching @ 25°C | | 3.96 | | mJ |
| E_{off} | Turn-off Switching Energy | $V_{GS} = 15\text{V}, V_{Bus} = 800\text{V}$ $I_D = 60\text{A}, R_G = 1.2\Omega$ | | 2.74 | | |
| E_{on} | Turn-on Switching Energy | Inductive switching @ 125°C | | 6.26 | | mJ |
| E_{off} | Turn-off Switching Energy | $V_{GS} = 15\text{V}, V_{Bus} = 800\text{V}$ $I_D = 60\text{A}, R_G = 1.2\Omega$ | | 3.43 | | |

Source - Drain diode ratings and characteristics

| Symbol | Characteristic | Test Conditions | Min | Typ | Max | Unit | |
|----------|---|---|---------------------------|-----|-----|---------------|----|
| I_S | Continuous Source current (Body diode) | $T_c = 25^\circ\text{C}$ | | | 60 | A | |
| | | $T_c = 80^\circ\text{C}$ | | | 45 | | |
| V_{SD} | Diode Forward Voltage | $V_{GS} = 0\text{V}, I_S = -60\text{A}$ | | | 1.3 | V | |
| dv/dt | Peak Diode Recovery ① | | | | 18 | V/ns | |
| t_{rr} | Reverse Recovery Time | $I_S = -60\text{A}$ $V_R = 600\text{V}$ $di/dt = 400\text{A}/\mu\text{s}$ | $T_j = 25^\circ\text{C}$ | | | 320 | ns |
| | | | $T_j = 125^\circ\text{C}$ | | | 650 | |
| Q_{rr} | Reverse Recovery Charge | $I_S = -60\text{A}$ $V_R = 600\text{V}$ $di/dt = 400\text{A}/\mu\text{s}$ | $T_j = 25^\circ\text{C}$ | | 8 | μC | |
| | | | $T_j = 125^\circ\text{C}$ | | 28 | | |

 ① dv/dt numbers reflect the limitations of the circuit rather than the device itself.

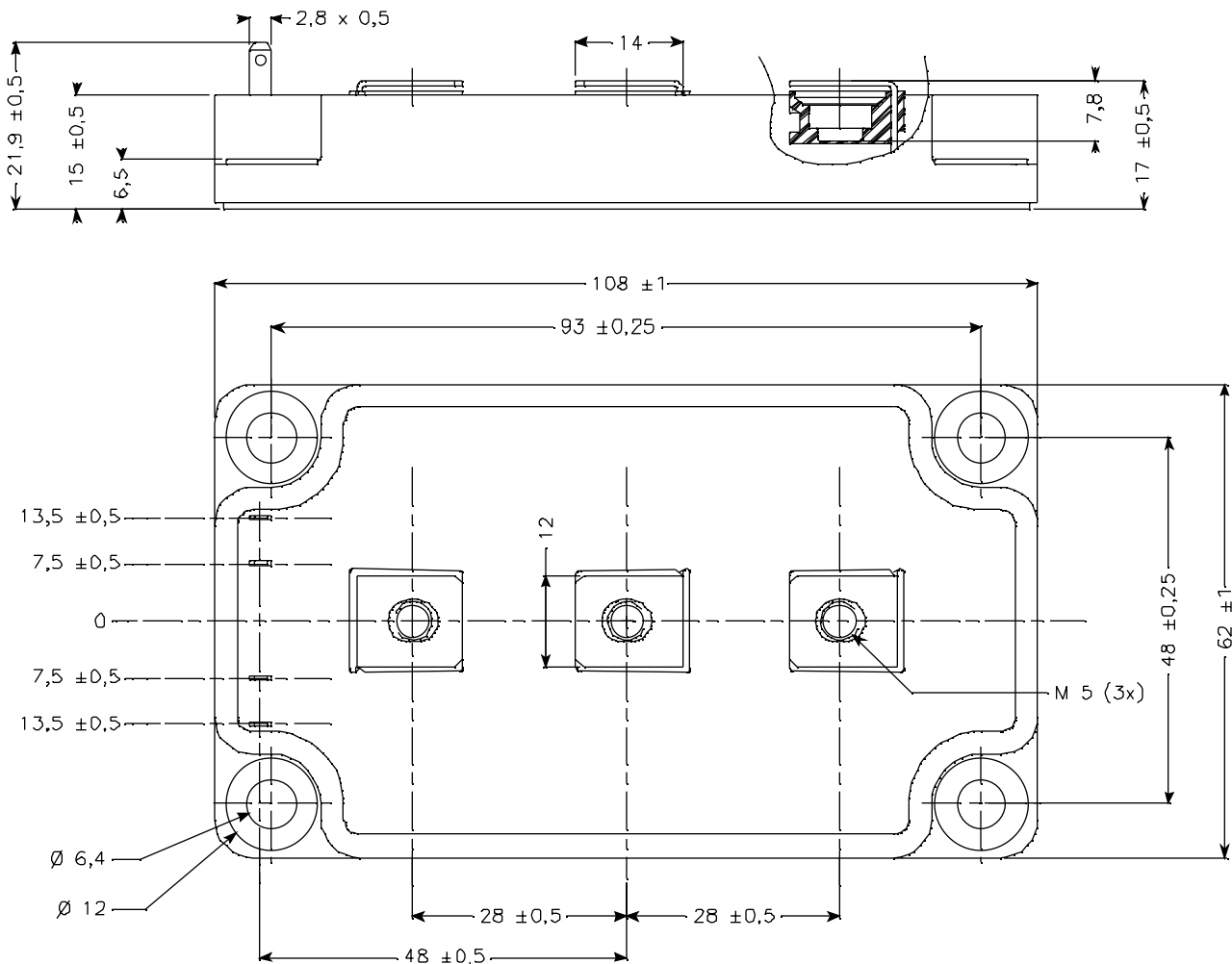
$$I_S \leq -60\text{A} \quad di/dt \leq 700\text{A}/\mu\text{s} \quad V_R \leq V_{DSS} \quad T_j \leq 150^\circ\text{C}$$

Thermal and package characteristics

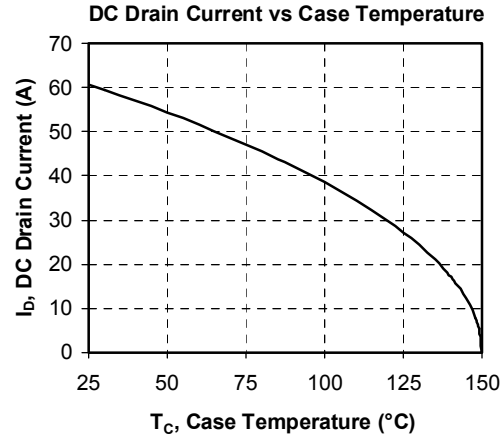
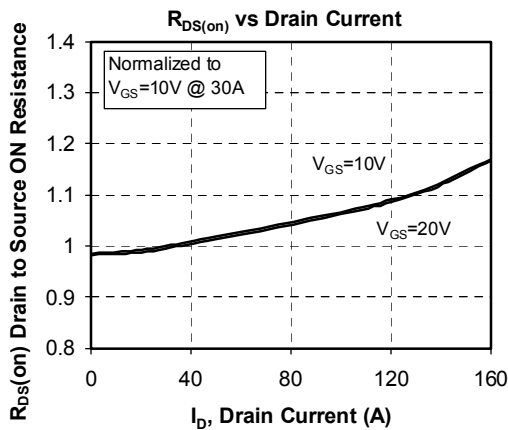
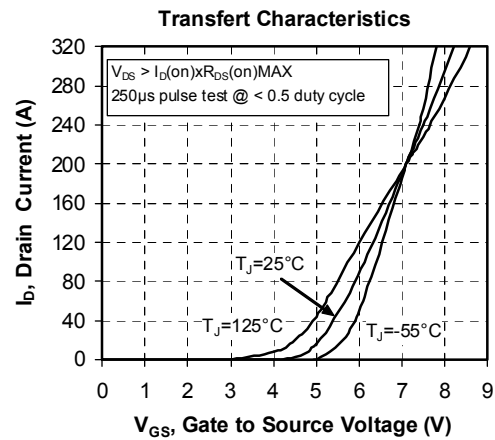
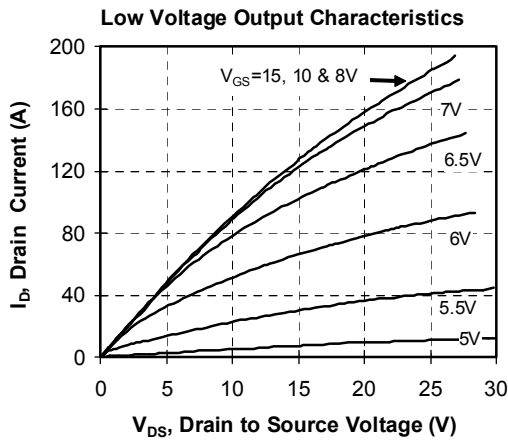
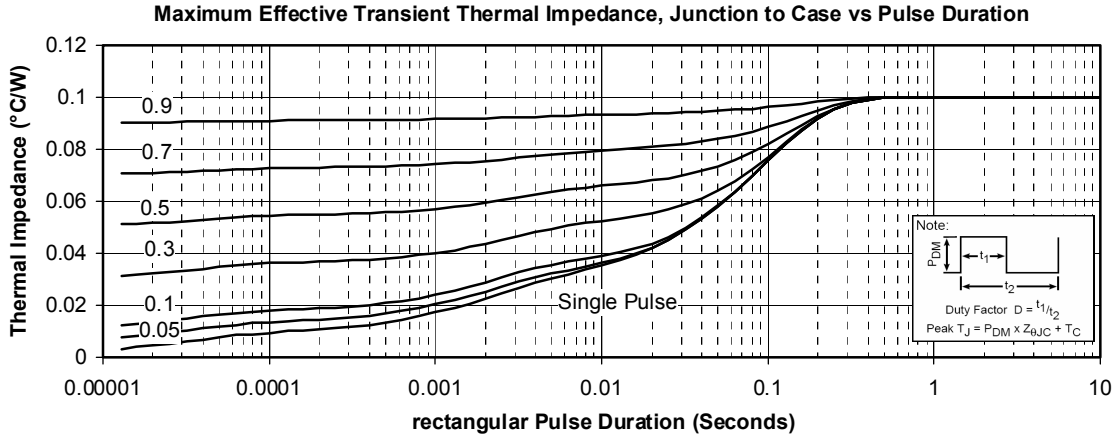
Symbol Characteristic

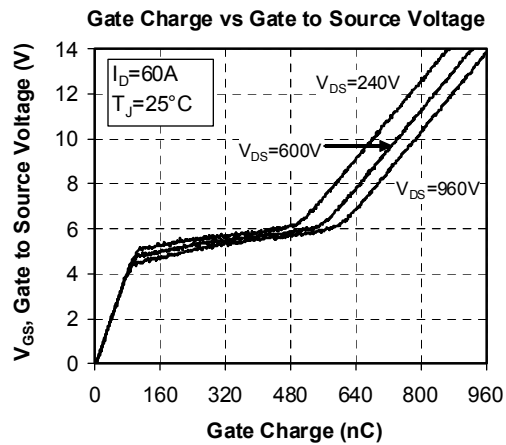
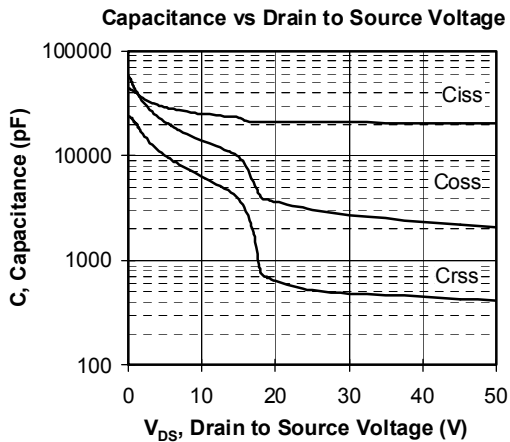
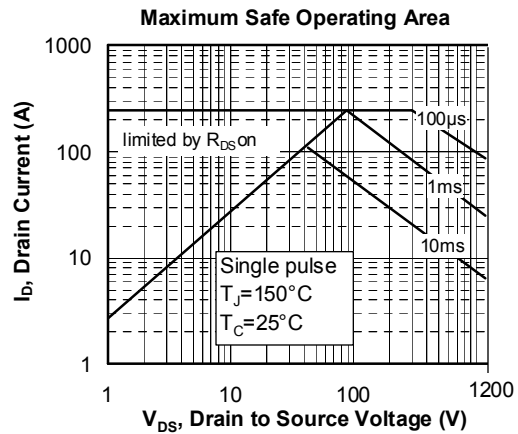
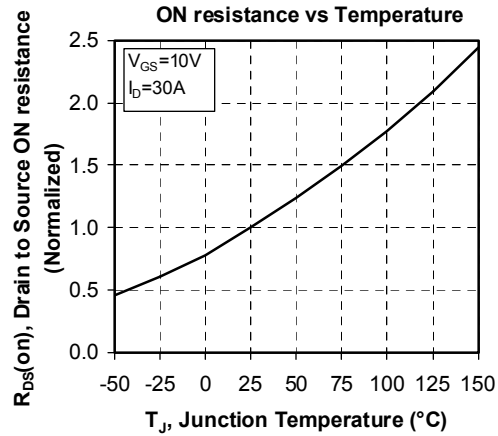
| | | <i>Min</i> | <i>Typ</i> | <i>Max</i> | <i>Unit</i> | |
|------------|--|---------------|------------|------------|-------------|-----|
| R_{thJC} | Junction to Case Thermal Resistance | | | 0.1 | °C/W | |
| V_{ISOL} | RMS Isolation Voltage, any terminal to case t = 1 min, I isol < 1mA, 50/60Hz | 2500 | | | V | |
| T_J | Operating junction temperature range | -40 | | 150 | °C | |
| T_{STG} | Storage Temperature Range | -40 | | 125 | | |
| T_C | Operating Case Temperature | -40 | | 100 | | |
| Torque | Mounting torque | To heatsink | M6 | 3 | 5 | N.m |
| | | For terminals | M5 | 2 | 3.5 | |
| Wt | Package Weight | | | 280 | g | |

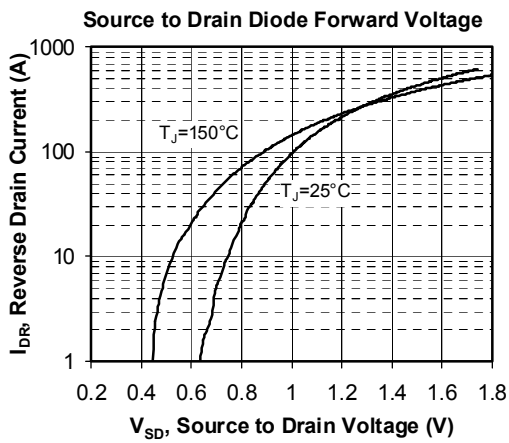
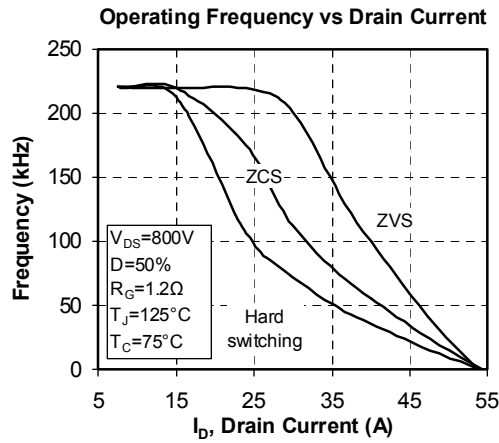
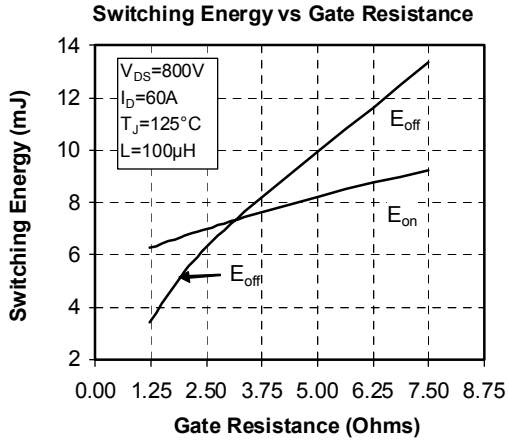
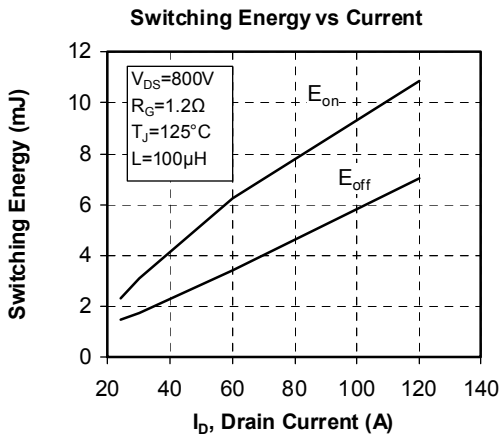
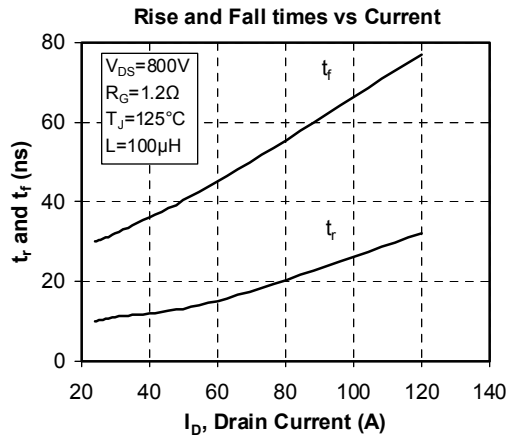
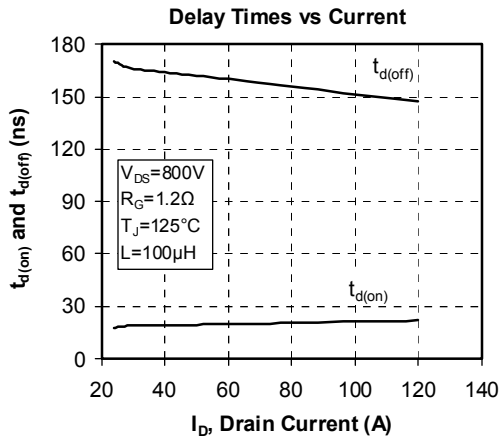
SP6 Package outline (dimensions in mm)



See application note APT0601 - Mounting Instructions for SP6 Power Modules on www.microsemi.com

Typical Performance Curve






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