



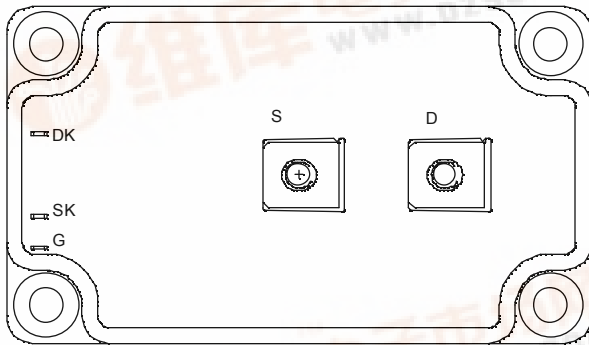
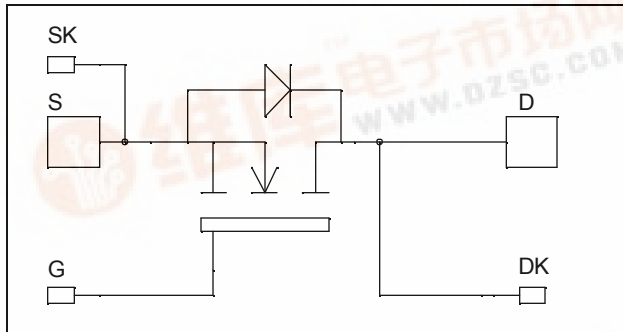
APT0502M01FAG

Single Switch MOSFET Power Module

$$V_{DS} = 100V$$

$$R_{DS(on)} = 1.5m\Omega \text{ typ @ } T_j = 25^\circ C$$

$$I_D = 860A^* @ T_c = 25^\circ C$$



Application

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

Features

- Power MOS V[®] FREDFETs
 - Low $R_{DS(on)}$
 - Low input and Miller capacitance
 - Low gate charge
 - Avalanche energy rated
 - Fast intrinsic diode
 - Very rugged
- Kelvin source for easy drive
- Very low stray inductance
 - Symmetrical design
 - M5 power connectors
- High level of integration
- AlN substrate for improved thermal performance

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_{DS}	Drain - Source Breakdown Voltage	100	V
I_D	Continuous Drain Current	$T_c = 25^\circ C$	860 *
		$T_c = 80^\circ C$	640 *
I_{DM}	Pulsed Drain current	2200	A
V_{GS}	Gate - Source Voltage	± 30	V
$R_{DS(on)}$	Drain - Source ON Resistance	1.6	m Ω
P_D	Maximum Power Dissipation	$T_c = 25^\circ C$	2500
I_{AR}	Avalanche current (repetitive and non repetitive)	100	A
E_{AR}	Repetitive Avalanche Energy	50	mJ
E_{AS}	Single Pulse Avalanche Energy	3000	

* Specification of MOSFET device but output current must be limited to 500A to not exceed a delta of temperature greater than 100°C for the connectors.

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	$V_{GS} = 0V, V_{DS} = 100V$ $T_j = 25^\circ\text{C}$			500	μA
		$V_{GS} = 0V, V_{DS} = 80V$ $T_j = 125^\circ\text{C}$			2000	
$R_{DS(on)}$	Drain – Source on Resistance	$V_{GS} = 10V, I_D = 275A$		1.5	1.6	$\text{m}\Omega$
$V_{GS(th)}$	Gate Threshold Voltage	$V_{GS} = V_{DS}, I_D = 12\text{mA}$	2		4	V
I_{GSS}	Gate – Source Leakage Current	$V_{GS} = \pm 30V, V_{DS} = 0V$			± 450	nA

Dynamic Characteristics

Symbol	Characteristic	Test Conditions	Min	Typ	Max	Unit
C_{iss}	Input Capacitance	$V_{GS} = 0V$		60		nF
C_{oss}	Output Capacitance	$V_{DS} = 25V$		23		
C_{rss}	Reverse Transfer Capacitance	$f = 1\text{MHz}$		8.8		
Q_g	Total gate Charge	$V_{GS} = 10V$		2100		nC
Q_{gs}	Gate – Source Charge	$V_{Bus} = 50V$		360		
Q_{gd}	Gate – Drain Charge	$I_D = 550A$		1080		
$T_{d(on)}$	Turn-on Delay Time	Inductive switching $V_{GS} = 15V$ $V_{Bus} = 66V$ $I_D = 550A$ $R_G = 1\Omega$		185		ns
T_r	Rise Time			270		
$T_{d(off)}$	Turn-off Delay Time			600		
T_f	Fall Time			175		
E_{on}	Turn-on Switching Energy	Inductive switching @ 25°C $V_{GS} = 15V, V_{Bus} = 66V$ $I_D = 550A, R_G = 1\Omega$		3.3		mJ
E_{off}	Turn-off Switching Energy			3.6		
E_{on}	Turn-on Switching Energy	Inductive switching @ 125°C $V_{GS} = 15V, V_{Bus} = 66V$ $I_D = 550A, R_G = 1\Omega$		3.65		mJ
E_{off}	Turn-off Switching Energy			3.85		

Source - Drain diode ratings and characteristics

Symbol	Characteristic	Test Conditions	Min	Typ	Max	Unit
I_S	Continuous Source current (Body diode)	$T_c = 25^\circ\text{C}$			860*	A
		$T_c = 80^\circ\text{C}$			640*	
V_{SD}	Diode Forward Voltage	$V_{GS} = 0V, I_S = -550A$			1.3	V
dv/dt	Peak Diode Recovery ❶				5	V/ns
t_{rr}	Reverse Recovery Time	$I_S = -550A$ $V_R = 66V$ $di/dt = 600A/\mu\text{s}$	$T_j = 25^\circ\text{C}$		190	ns
			$T_j = 125^\circ\text{C}$		370	
Q_{rr}	Reverse Recovery Charge	$I_S = -550A$ $V_R = 66V$ $di/dt = 600A/\mu\text{s}$	$T_j = 25^\circ\text{C}$	2.4		μC
			$T_j = 125^\circ\text{C}$	10.2		

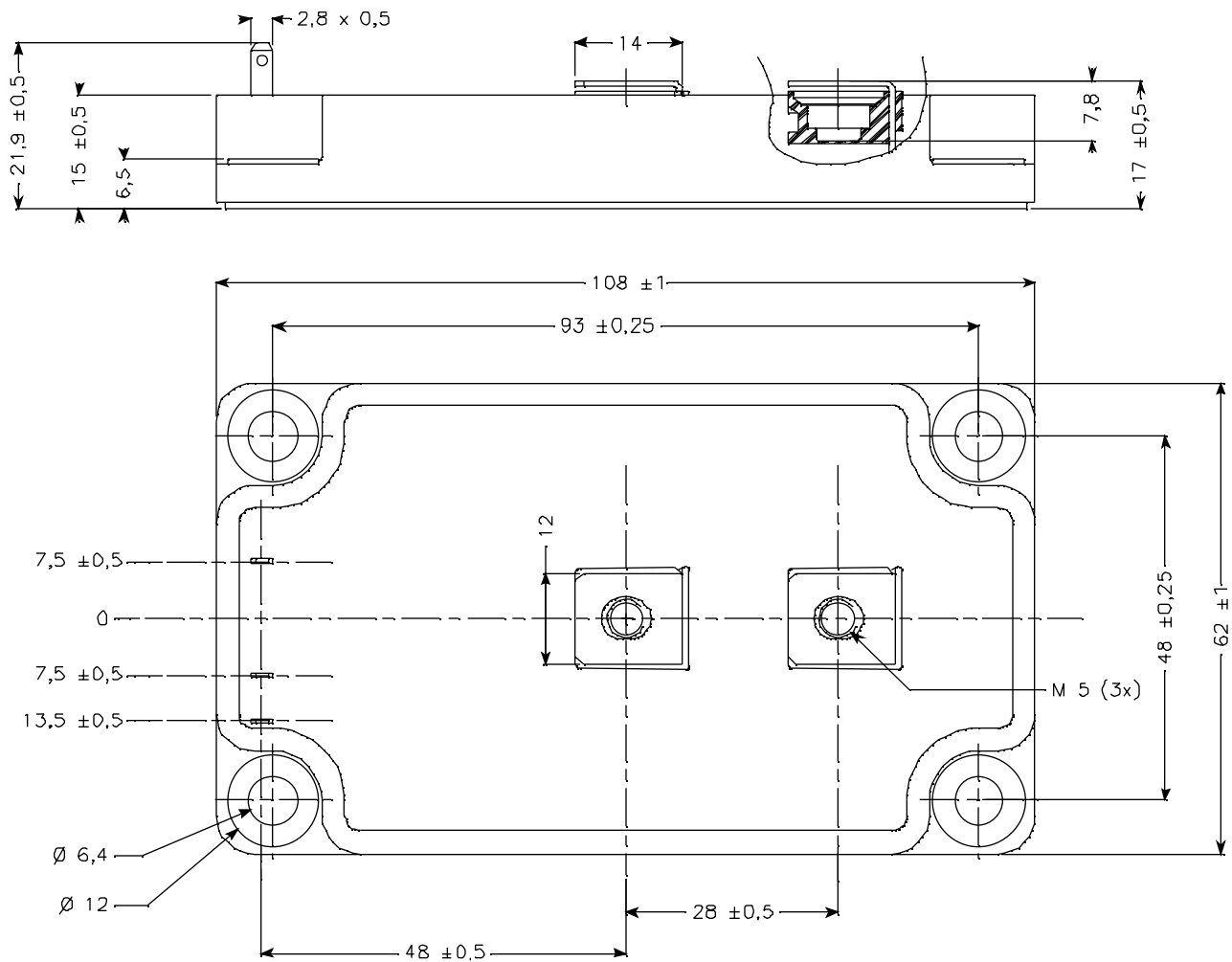
❶ dv/dt numbers reflect the limitations of the circuit rather than the device itself.

$I_S \leq -860A$ $di/dt \leq 600A/\mu\text{s}$ $V_R \leq V_{DSS}$ $T_j \leq 150^\circ\text{C}$

Thermal and package characteristics

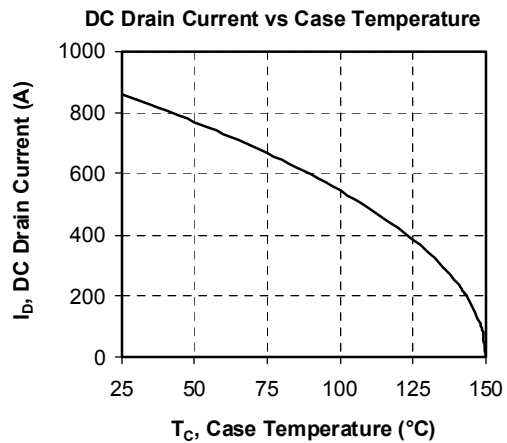
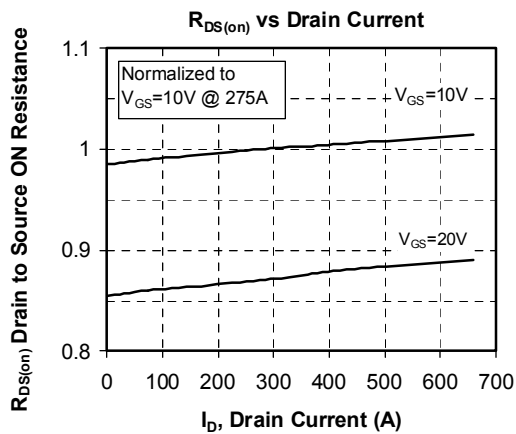
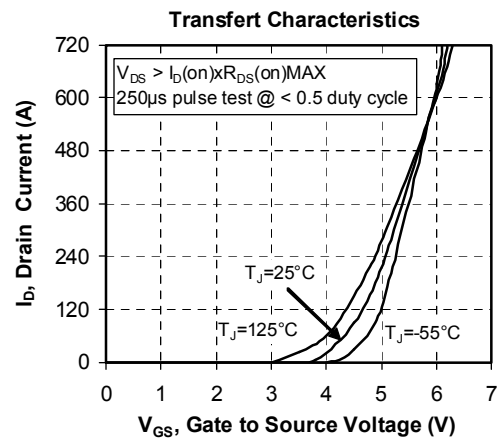
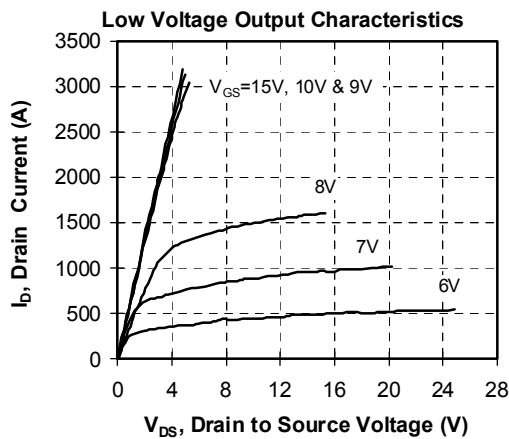
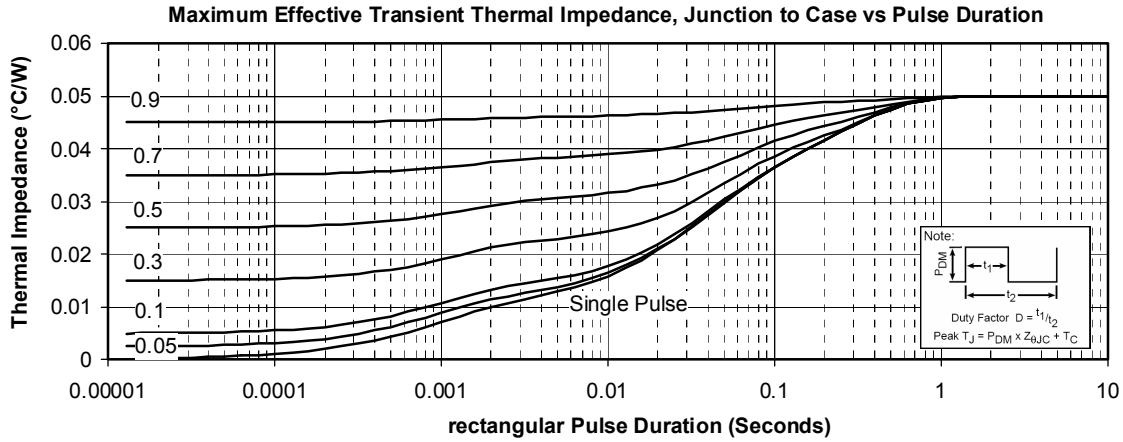
Symbol	Characteristic	Min	Typ	Max	Unit
R_{thJC}	Junction to Case Thermal Resistance			0.05	°C/W
V_{ISOL}	RMS Isolation Voltage, any terminal to case $t = 1$ min, $I_{isol} < 1$ mA, 50/60Hz	2500			V
T_J	Operating junction temperature range	-40		150	°C
T_{STG}	Storage Temperature Range	-40		125	
T_C	Operating Case Temperature	-40		100	
Torque	Mounting torque	To heatsink	M6	3	N.m
		For terminals	M5	2	
Wt	Package Weight			280	g

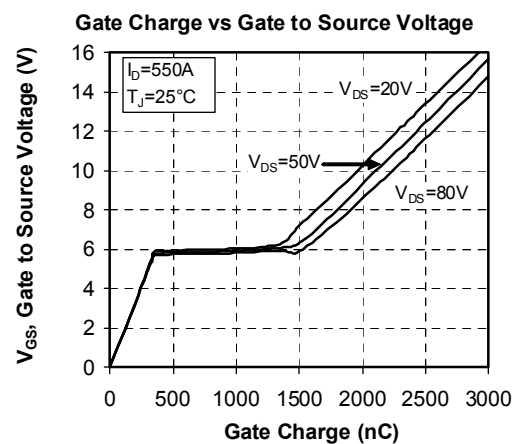
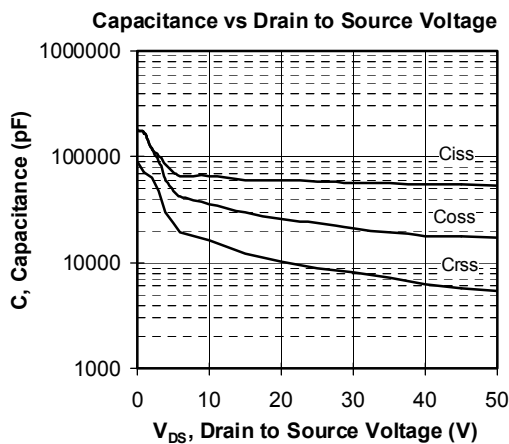
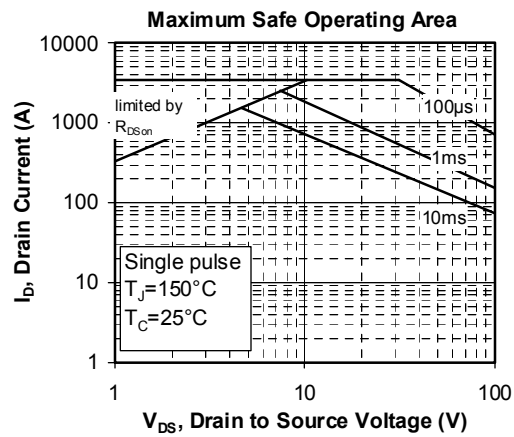
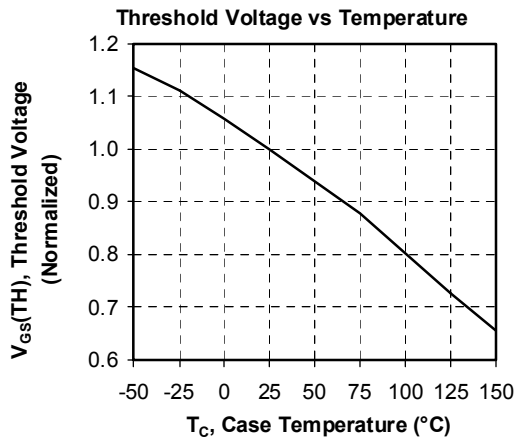
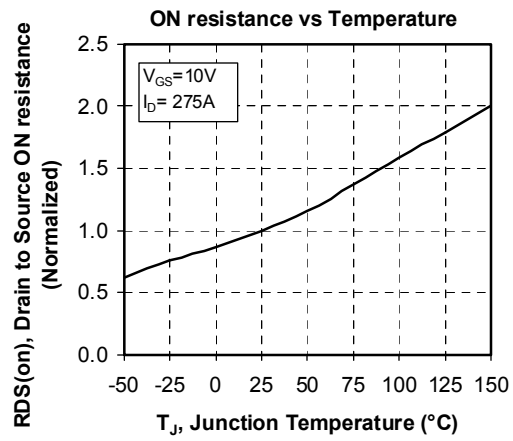
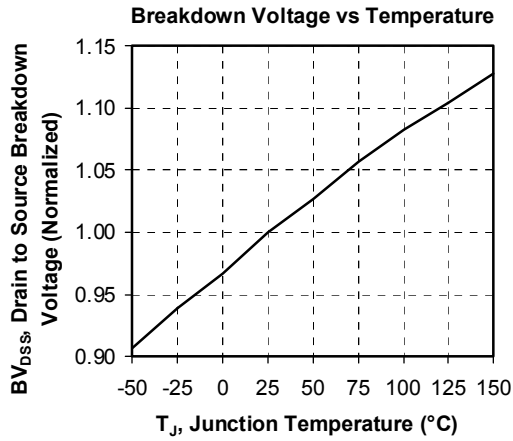
SP6 Package outline (dimensions in mm)

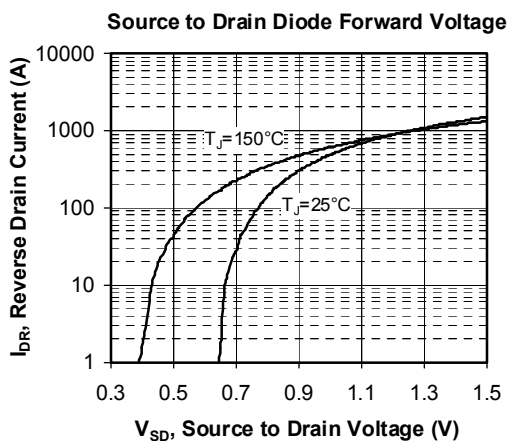
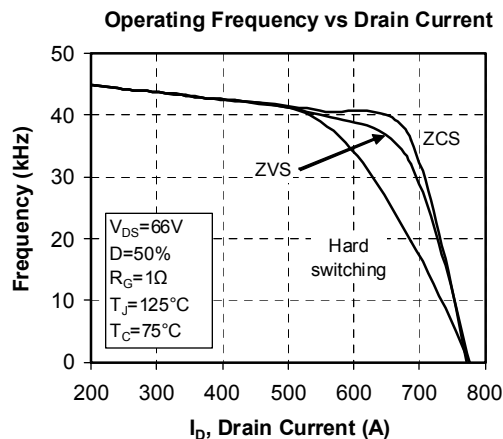
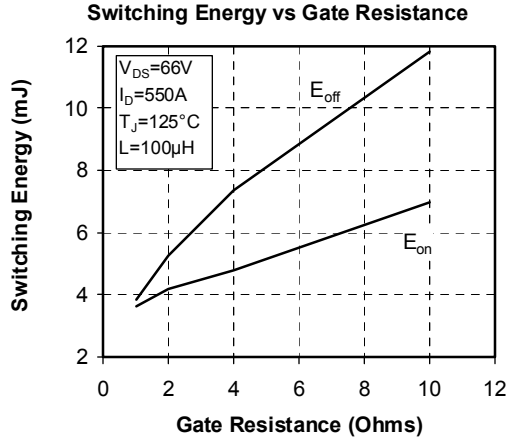
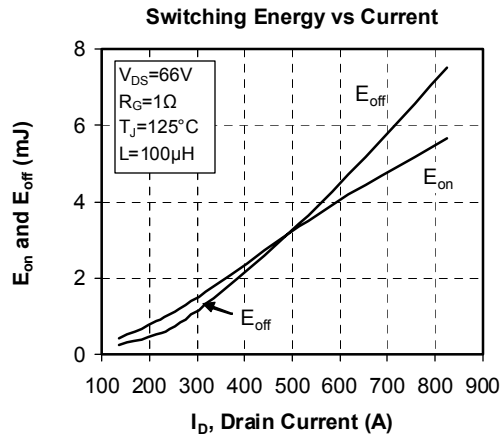
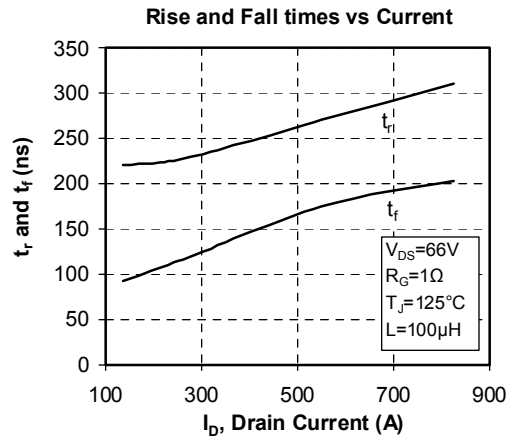
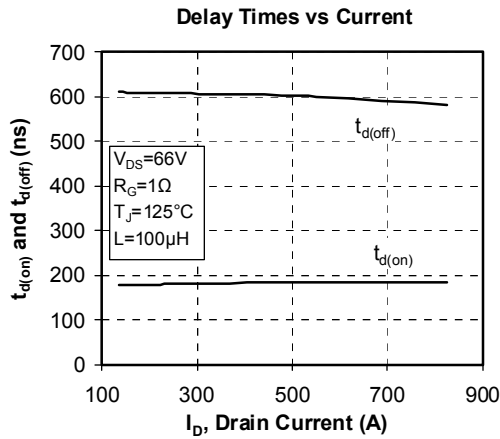


See application note APT0601 - Mounting Instructions for SP6 Power Modules on www.microsemi.com

Typical Performance Curve







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