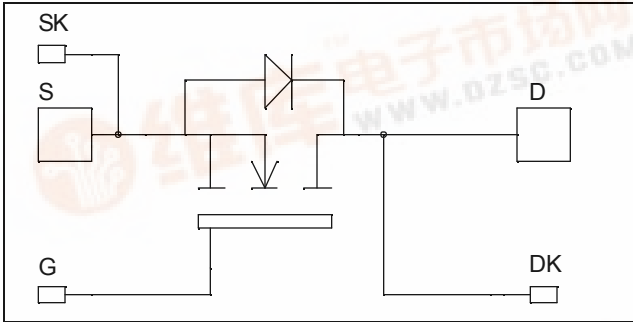




APT0502UM60FAG

Single Switch MOSFET Power Module

$V_{DSS} = 1000V$
 $R_{DSon} = 60m\Omega \text{ typ @ } T_j = 25^\circ C$
 $I_D = 129A \text{ @ } T_c = 25^\circ C$

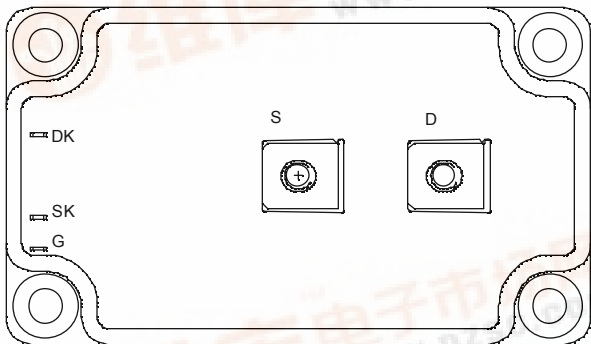


Application

- 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
- 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_{DSS}	Drain - Source Breakdown Voltage	1000	V
I_D	Continuous Drain Current	$T_c = 25^\circ C$	129
		$T_c = 80^\circ C$	97
I_{DM}	Pulsed Drain current	516	
V_{GS}	Gate - Source Voltage	± 30	V
R_{DSon}	Drain - Source ON Resistance	70	$m\Omega$
P_D	Maximum Power Dissipation	$T_c = 25^\circ C$	2272
I_{AR}	Avalanche current (repetitive and non repetitive)	25	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	$V_{GS} = 0V, V_{DS} = 1000V$	$T_j = 25^\circ\text{C}$			600	μA
		$V_{GS} = 0V, V_{DS} = 800V$	$T_j = 125^\circ\text{C}$			3	
$R_{DS(on)}$	Drain – Source on Resistance	$V_{GS} = 10V, I_D = 64.5A$		60	70	$\text{m}\Omega$	
$V_{GS(th)}$	Gate Threshold Voltage	$V_{GS} = V_{DS}, I_D = 15\text{mA}$	3		5	V	
I_{GSS}	Gate – Source Leakage Current	$V_{GS} = \pm 30V, V_{DS} = 0V$			± 500	nA	

Dynamic Characteristics

Symbol	Characteristic	Test Conditions	Min	Typ	Max	Unit
C_{iss}	Input Capacitance	$V_{GS} = 0V$		31.1		nF
C_{oss}	Output Capacitance	$V_{DS} = 25V$		5.28		
C_{rss}	Reverse Transfer Capacitance	$f = 1\text{MHz}$		0.96		
Q_g	Total gate Charge	$V_{GS} = 10V$		1116		nC
Q_{gs}	Gate – Source Charge	$V_{Bus} = 500V$		144		
Q_{gd}	Gate – Drain Charge	$I_D = 129A$		732		
$T_{d(on)}$	Turn-on Delay Time	Inductive switching @ 125°C $V_{GS} = 15V$ $V_{Bus} = 670V$ $I_D = 129A$ $R_G = 0.8\Omega$		18		ns
T_r	Rise Time			12		
$T_{d(off)}$	Turn-off Delay Time			155		
T_f	Fall Time			40		
E_{on}	Turn-on Switching Energy	Inductive switching @ 25°C $V_{GS} = 15V, V_{Bus} = 670V$ $I_D = 129A, R_G = 0.8\Omega$		5.4		mJ
E_{off}	Turn-off Switching Energy			3.7		
E_{on}	Turn-on Switching Energy	Inductive switching @ 125°C $V_{GS} = 15V, V_{Bus} = 670V$ $I_D = 129A, R_G = 0.8\Omega$		8.5		mJ
E_{off}	Turn-off Switching Energy			4.7		

Source - Drain diode ratings and characteristics

Symbol	Characteristic	Test Conditions	Min	Typ	Max	Unit	
I_S	Continuous Source current (Body diode)	$T_c = 25^\circ\text{C}$			129	A	
		$T_c = 80^\circ\text{C}$			97		
V_{SD}	Diode Forward Voltage	$V_{GS} = 0V, I_S = -129A$			1.3	V	
dv/dt	Peak Diode Recovery ①				18	V/ns	
t_{rr}	Reverse Recovery Time	$I_S = -129A$ $V_R = 670V$ $di_s/dt = 600A/\mu\text{s}$	$T_j = 25^\circ\text{C}$			320	ns
			$T_j = 125^\circ\text{C}$			650	
Q_{rr}	Reverse Recovery Charge	$I_S = -129A$ $V_R = 670V$ $di_s/dt = 600A/\mu\text{s}$	$T_j = 25^\circ\text{C}$		21.6	μC	
			$T_j = 125^\circ\text{C}$		58.3		

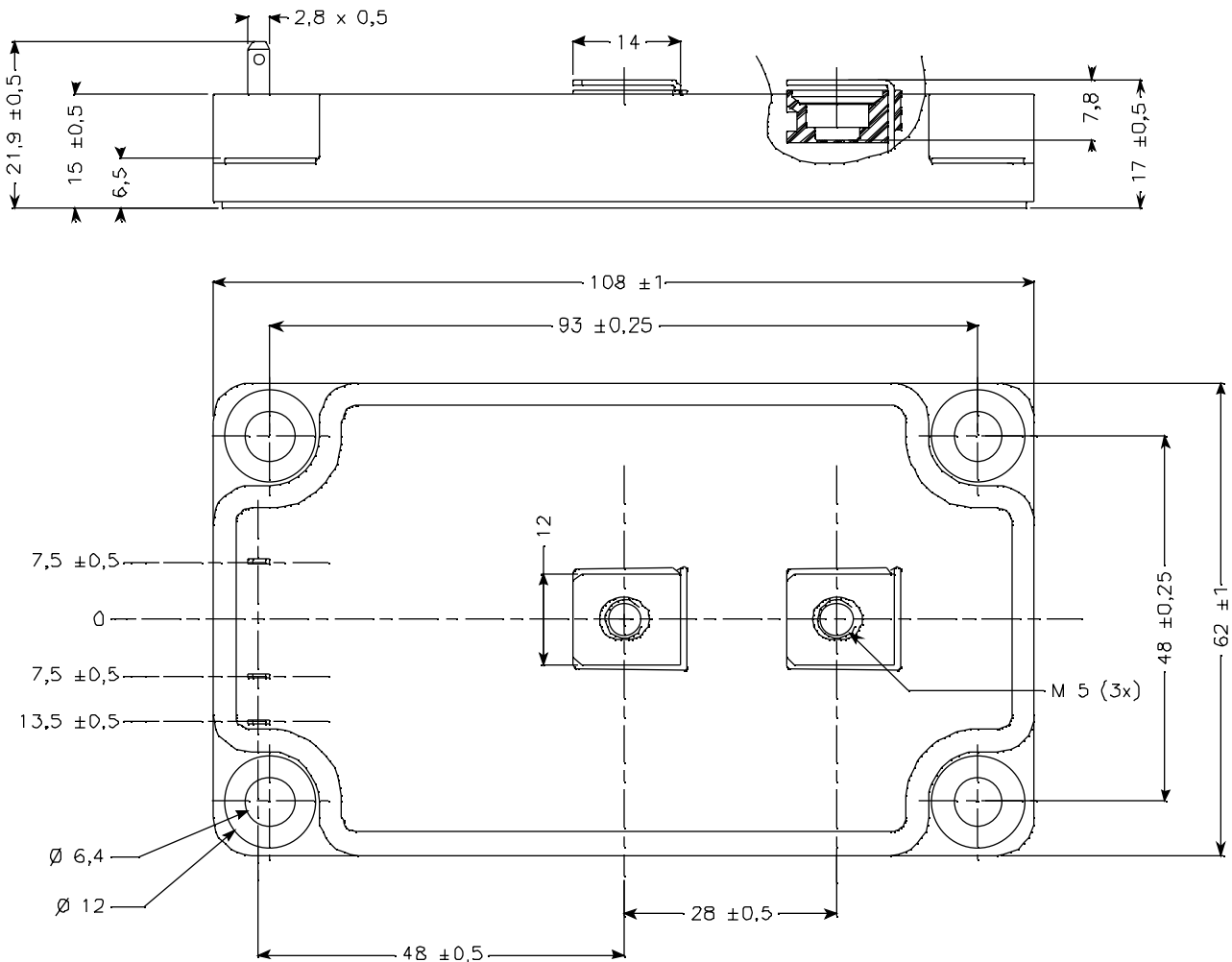
 ① dv/dt numbers reflect the limitations of the circuit rather than the device itself.

$$I_S \leq -129A \quad di/dt \leq 700A/\mu\text{s} \quad V_R \leq V_{DSS} \quad T_j \leq 150^\circ\text{C}$$

Thermal and package characteristics

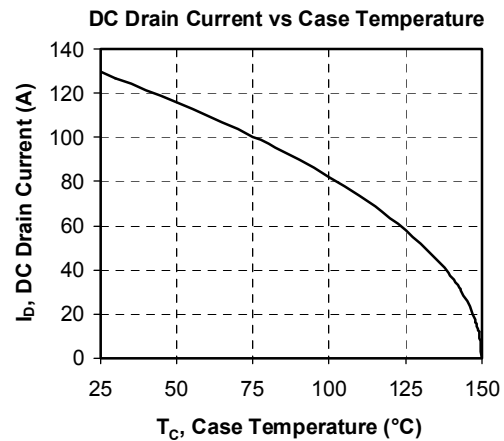
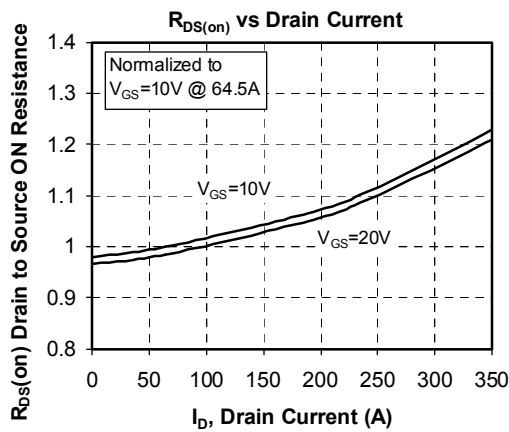
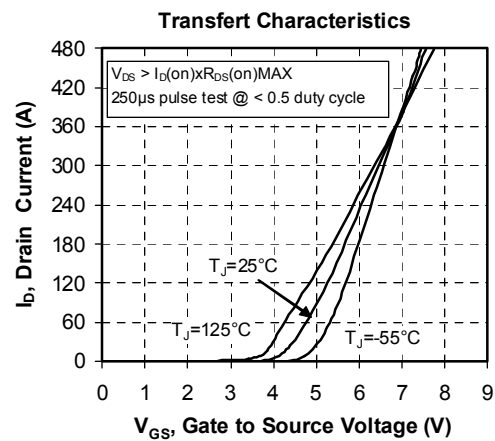
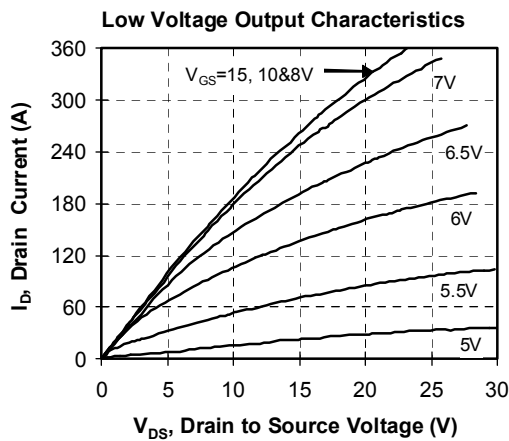
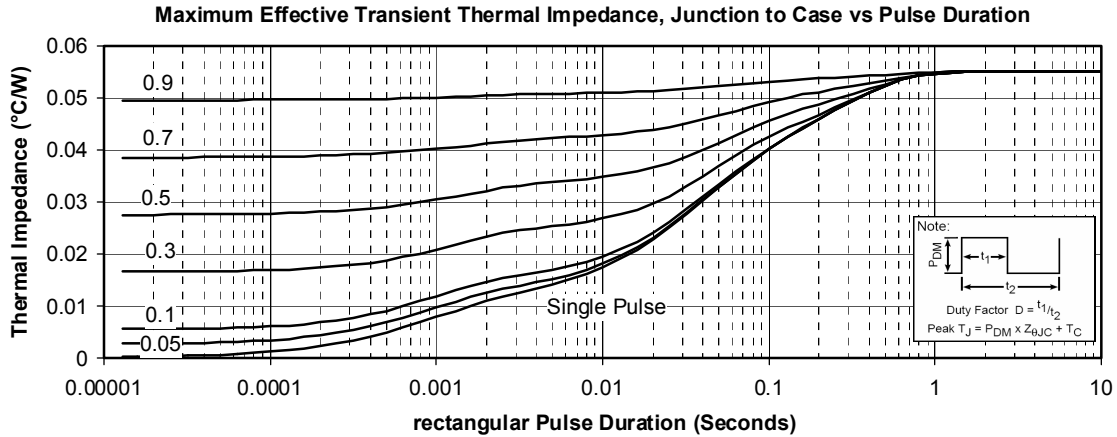
Symbol	Characteristic	Min	Typ	Max	Unit	
R_{thJC}	Junction to Case Thermal Resistance			0.055	°C/W	
V_{ISOL}	RMS Isolation Voltage, any terminal to case t = 1 min, I isol < 1mA, 50/60Hz	2500			V	
T_J	Operating junction temperature range	-40		150	°C	
T_{STG}	Storage Temperature Range	-40		125		
T_C	Operating 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	

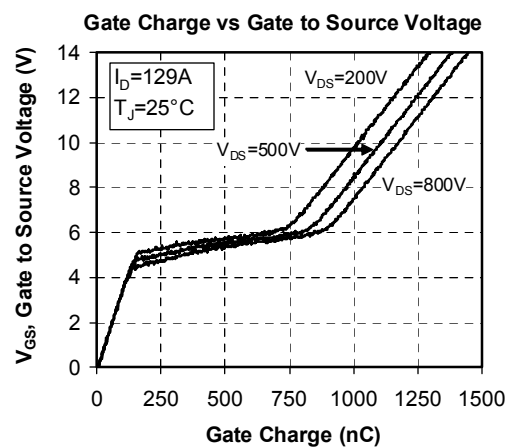
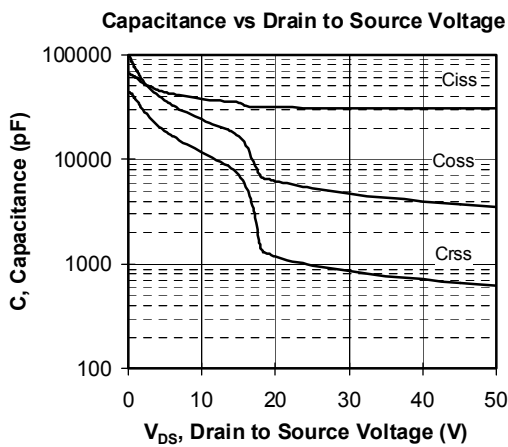
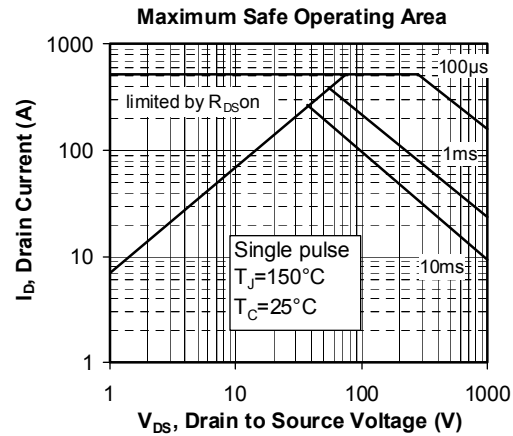
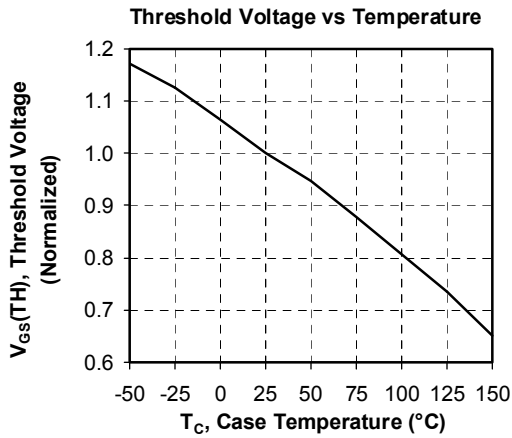
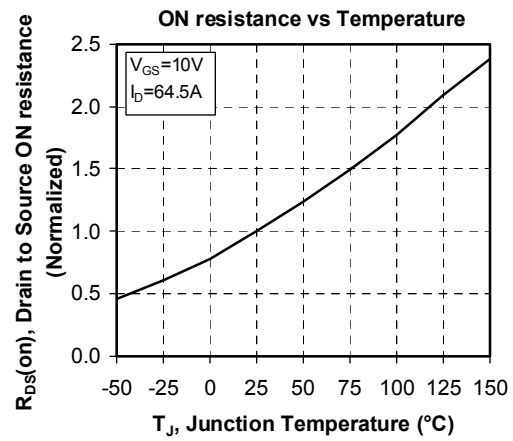
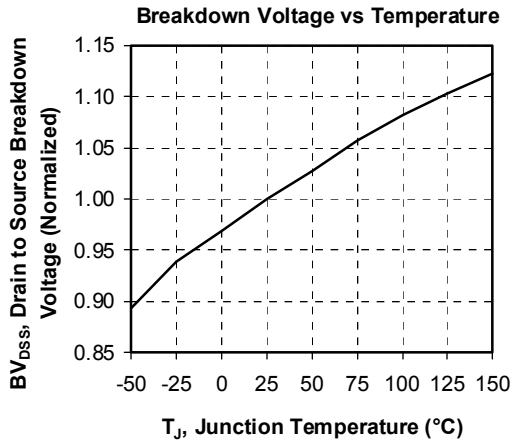
SP6 Package outline (dimensions in mm)

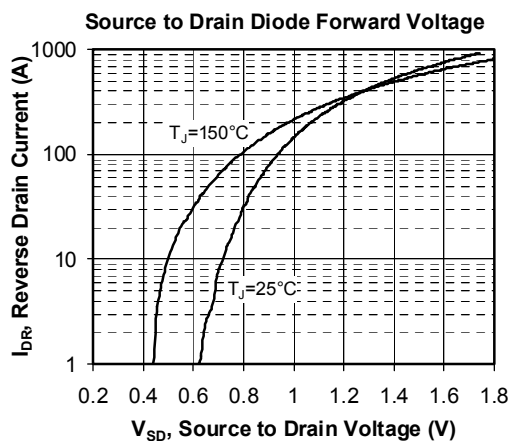
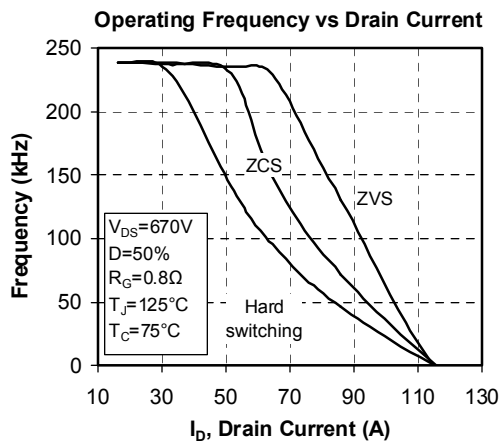
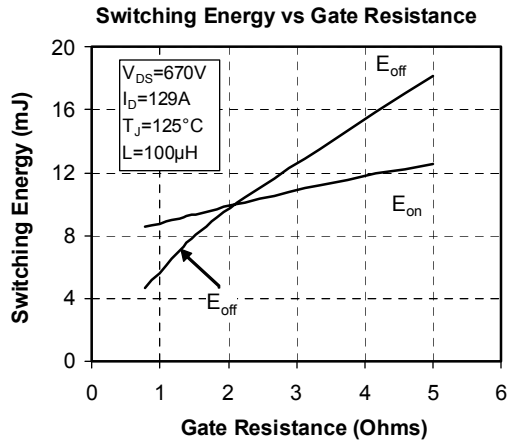
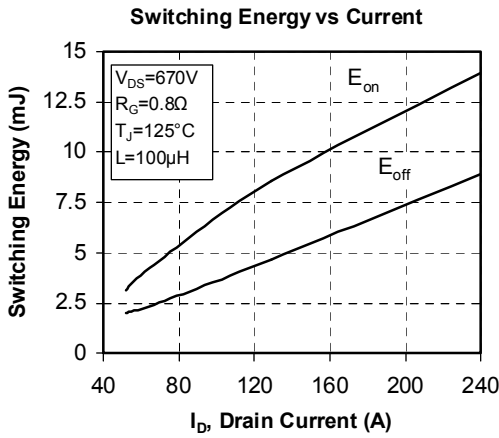
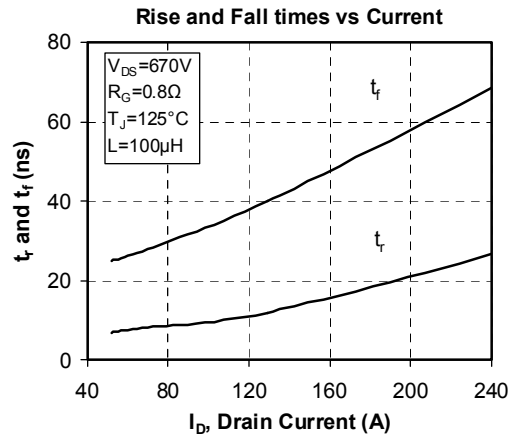
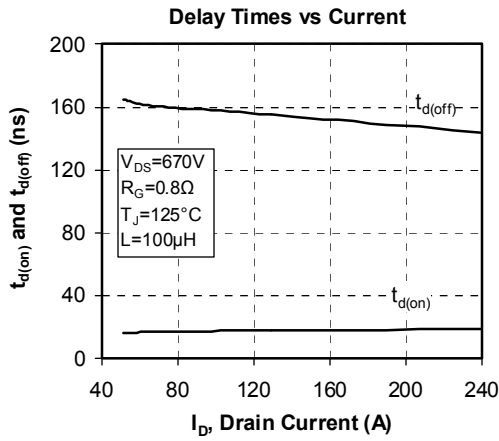


See application note APT0601 - Mounting Instructions for SP6 Power Modules on www.microsemi.com

Typical Performance Curve







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