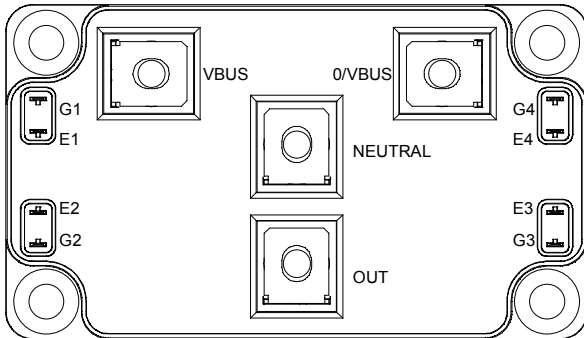
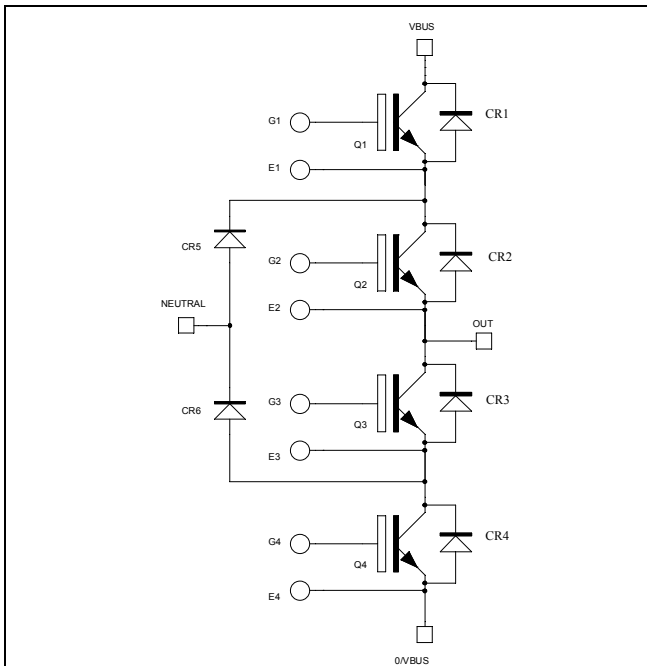


**Three level inverter
Trench + Field Stop IGBT4
Power Module**

**$V_{CES} = 1200V$
 $I_C = 240A @ T_c = 80^\circ C$**



Application

- Solar converter
- Uninterruptible Power Supplies

Features

- Trench + Field Stop IGBT 4 Technology
 - Low voltage drop
 - Low leakage current
 - Low switching losses
 - Soft recovery parallel diodes
 - Low diode VF
 - RBSOA and SCSOA rated
- Kelvin emitter for easy drive
- Very low stray inductance
 - Symmetrical design
 - M5 power connectors
- High level of integration

Benefits

- Stable temperature behavior
- Very rugged
- Direct mounting to heatsink (isolated package)
- Low junction to case thermal resistance
- Easy paralleling due to positive TC of VCEsat
- Low profile
- RoHS Compliant

Q1 to Q4 Absolute maximum ratings

Symbol	Parameter		Max ratings	Unit
V_{CES}	Collector - Emitter Breakdown Voltage		1200	V
I_C	Continuous Collector Current	$T_c = 25^\circ C$	305	A
		$T_c = 80^\circ C$	240	
I_{CM}	Pulsed Collector Current	$T_c = 25^\circ C$	400	
V_{GE}	Gate - Emitter Voltage		± 20	V
P_D	Maximum Power Dissipation	$T_c = 25^\circ C$	1000	W
RBSOA	Reverse Bias Safe Operating Area	$T_j = 150^\circ C$	400A @ 1150V	

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

Q1 to Q4 Electrical Characteristics

Symbol	Characteristic	Test Conditions	Min	Typ	Max	Unit
I_{CES}	Zero Gate Voltage Collector Current	$V_{GE} = 0V$; $V_{CE} = 1200V$			2	mA
$V_{CE(sat)}$	Collector Emitter Saturation Voltage	$V_{GE} = 15V$ $I_C = 200A$	$T_j = 25^\circ\text{C}$	1.8	2.2	V
			$T_j = 150^\circ\text{C}$	2.2		
$V_{GE(th)}$	Gate Threshold Voltage	$V_{GE} = V_{CE}$, $I_C = 5\text{ mA}$	5	5.8	6.5	V

Q1 to Q4 Dynamic Characteristics

Symbol	Characteristic	Test Conditions	Min	Typ	Max	Unit
C_{ies}	Input Capacitance	$V_{GE} = 0V$		12.3		nF
C_{oes}	Output Capacitance	$V_{CE} = 25V$		0.8		
C_{res}	Reverse Transfer Capacitance	$f = 1\text{MHz}$		0.69		
Q_G	Gate charge	$V_{GE} = \pm 15V$		1.7		μC
$T_{d(on)}$	Turn-on Delay Time	Inductive Switching (25°C) $V_{GE} = \pm 15V$ $V_{CE} = 600V$ $I_C = 200A$ $R_G = 3.6\Omega$		160		ns
T_r	Rise Time			30		
$T_{d(off)}$	Turn-off Delay Time			340		
T_f	Fall Time			80		
$T_{d(on)}$	Turn-on Delay Time	Inductive Switching (150°C) $V_{GE} = \pm 15V$ $V_{CE} = 600V$ $I_C = 200A$ $R_G = 3.6\Omega$		170		ns
T_r	Rise Time			40		
$T_{d(off)}$	Turn-off Delay Time			450		
T_f	Fall Time			170		
E_{on}	Turn-on Switching Energy	$V_{GE} = \pm 15V$ $V_{CE} = 600V$ $I_C = 200A$	$T_j = 25^\circ\text{C}$	10.4		mJ
			$T_j = 150^\circ\text{C}$	21		
E_{off}	Turn-off Switching Energy	$R_G = 3.6\Omega$	$T_j = 25^\circ\text{C}$	11		mJ
			$T_j = 150^\circ\text{C}$	18.6		
I_{SC}	Short circuit current	$V_{GE} \leq 15V$; $V_{CC} = 900V$ $t_p \leq 10\mu\text{s}$; $T_j = 150^\circ\text{C}$		1000		A
R_{thJC}	Junction to Case Thermal Resistance				0.15	$^\circ\text{C/W}$

CR1 to CR4 diode ratings and characteristics

Symbol	Characteristic	Test Conditions	Min	Typ	Max	Unit
V_{RRM}	Maximum Peak Repetitive Reverse Voltage		1200			V
I_{RM}	Maximum Reverse Leakage Current	$V_R = 1200V$			150	μA
					400	
I_F	DC Forward Current			180		A
V_F	Diode Forward Voltage	$I_F = 150A$ $V_{GE} = 0V$	$T_j = 25^\circ\text{C}$	1.7	2.2	V
			$T_j = 150^\circ\text{C}$	1.65		
t_{rr}	Reverse Recovery Time	$I_F = 150A$ $V_R = 600V$ $di/dt = 3800A/\mu\text{s}$	$T_j = 25^\circ\text{C}$	155		ns
			$T_j = 150^\circ\text{C}$	300		
Q_{rr}	Reverse Recovery Charge		$T_j = 25^\circ\text{C}$	14.6		μC
			$T_j = 150^\circ\text{C}$	30.4		
E_{rr}	Reverse Recovery Energy		$T_j = 25^\circ\text{C}$	5.2		mJ
			$T_j = 150^\circ\text{C}$	11		
R_{thJC}	Junction to Case Thermal Resistance				0.32	$^\circ\text{C/W}$

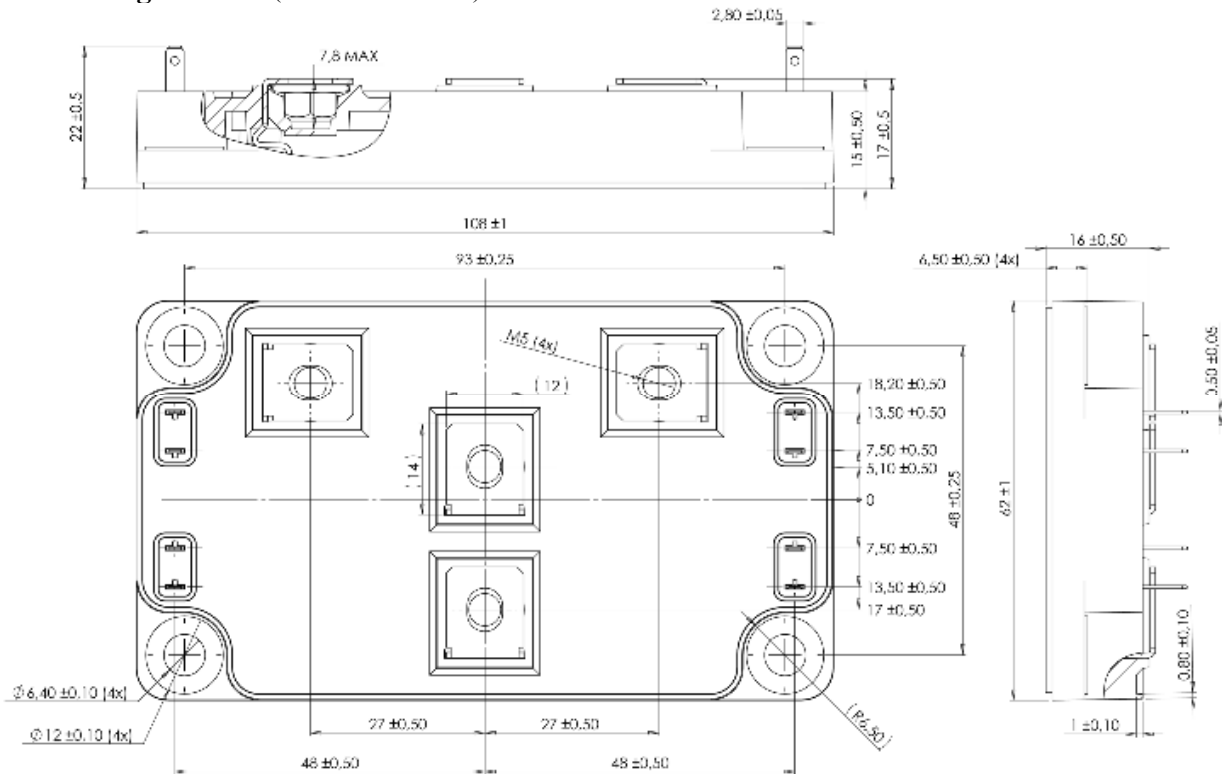
CR5 & CR6 diode ratings and characteristics

<i>Symbol</i>	<i>Characteristic</i>	<i>Test Conditions</i>		<i>Min</i>	<i>Typ</i>	<i>Max</i>	<i>Unit</i>
V _{RRM}	Maximum Peak Repetitive Reverse Voltage			1200			V
I _{RM}	Maximum Reverse Leakage Current	V _R =1200V	T _j = 25°C T _j = 150°C			150 400	μA
I _F	DC Forward Current		T _c = 80°C		240		A
V _F	Diode Forward Voltage	I _F = 200A V _{GE} = 0V	T _j = 25°C T _j = 150°C		1.9 1.85	2.4	V
t _{rr}	Reverse Recovery Time		T _j = 25°C T _j = 150°C		155 300		ns
Q _{rr}	Reverse Recovery Charge	I _F = 200A V _R = 600V di/dt = 4000A/μs	T _j = 25°C T _j = 150°C		18.6 39		μC
E _{rr}	Reverse Recovery Energy		T _j = 25°C T _j = 150°C		8.2 16		mJ
R _{thJC}	Junction to Case Thermal Resistance					0.25	°C/W

Thermal and package characteristics

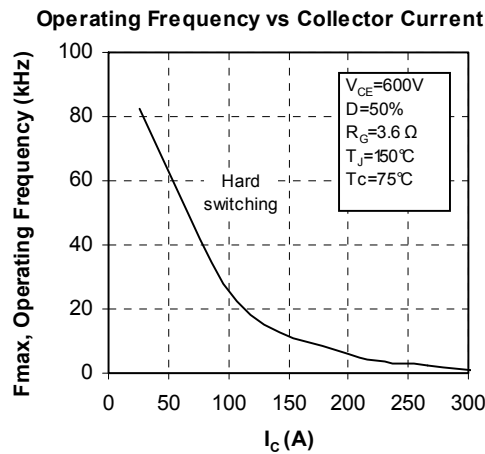
<i>Symbol</i>	<i>Characteristic</i>			<i>Min</i>	<i>Typ</i>	<i>Max</i>	<i>Unit</i>
V _{ISOL}	RMS Isolation Voltage, any terminal to case t=1 min, 50/60Hz			4000			V
T _J	Operating junction temperature range			-40		175	°C
T _{STG}	Storage Temperature Range			-40		125	
T _C	Operating Case Temperature			-40		100	
Torque	Mounting torque	To heatsink	M6	3		5	N.m
		For terminals	M5	2		3.5	
Wt	Package Weight					300	g

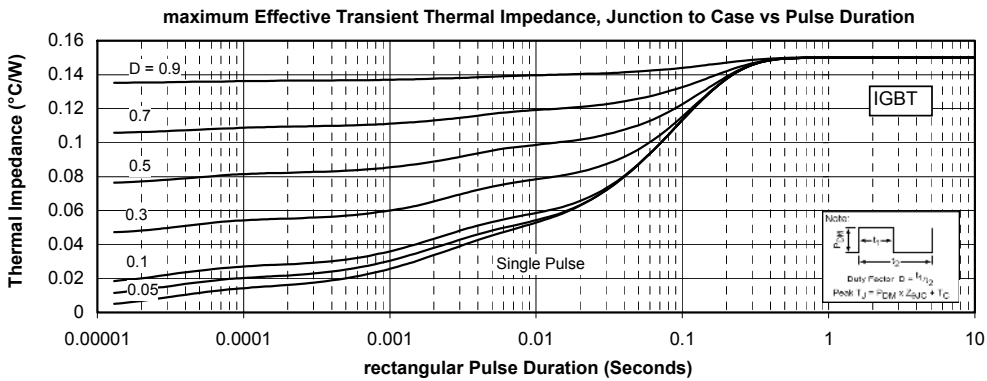
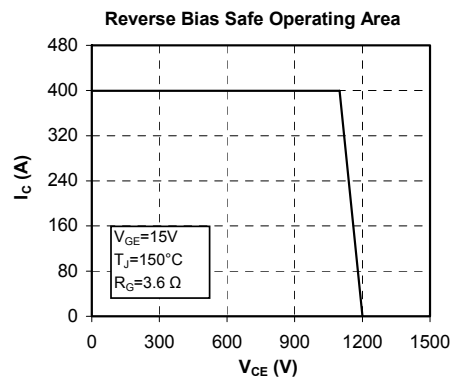
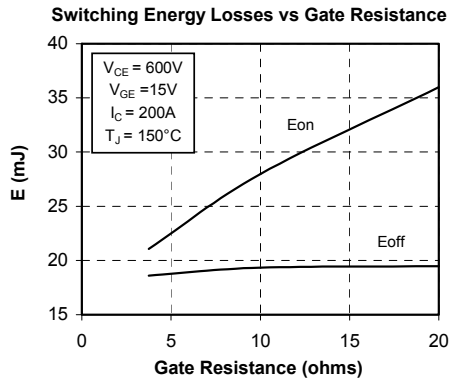
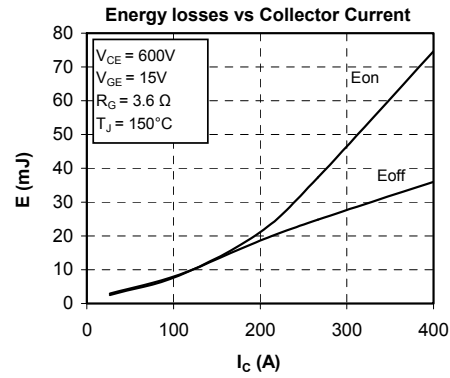
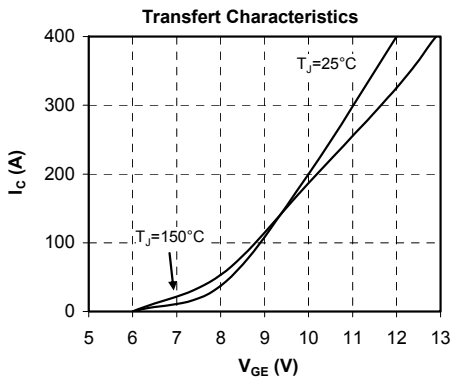
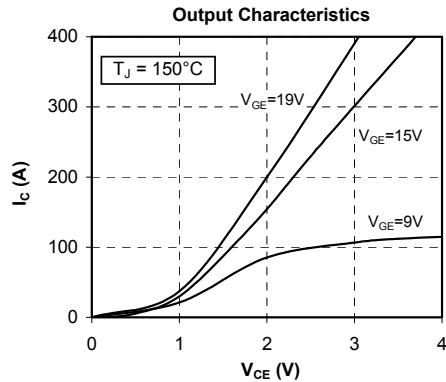
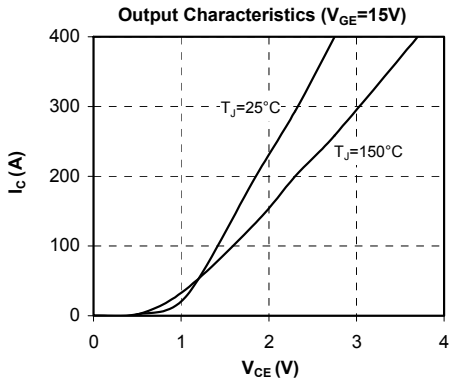
SP6 Package outline (dimensions in mm)

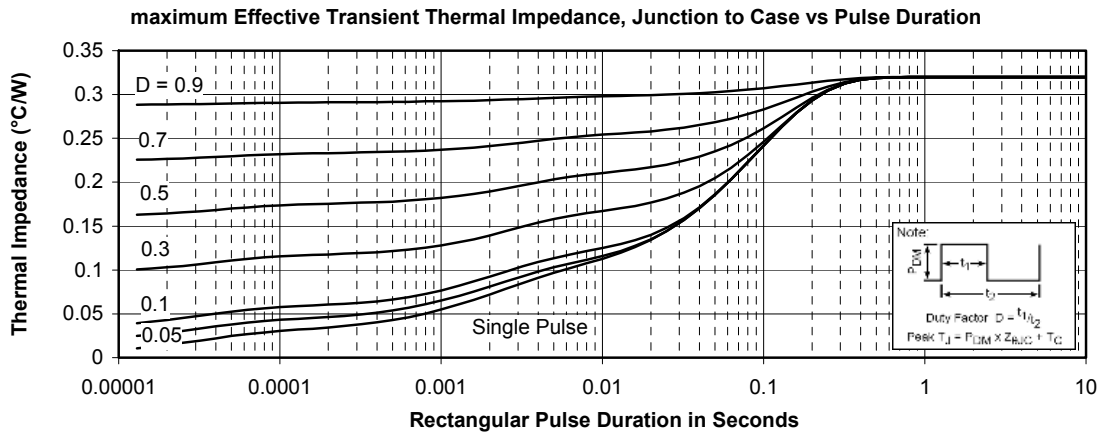
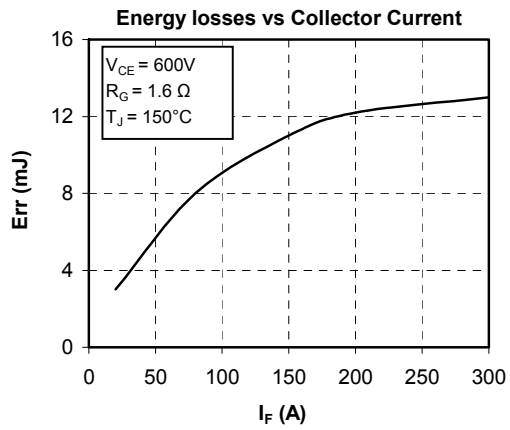
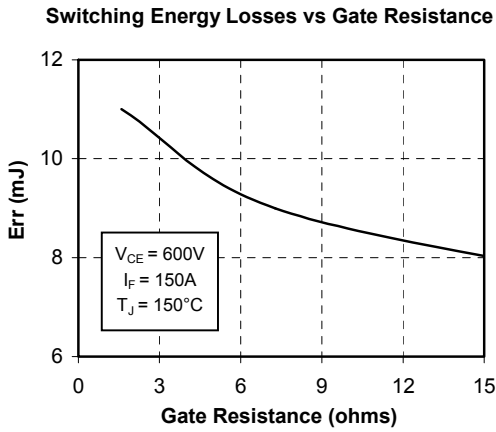
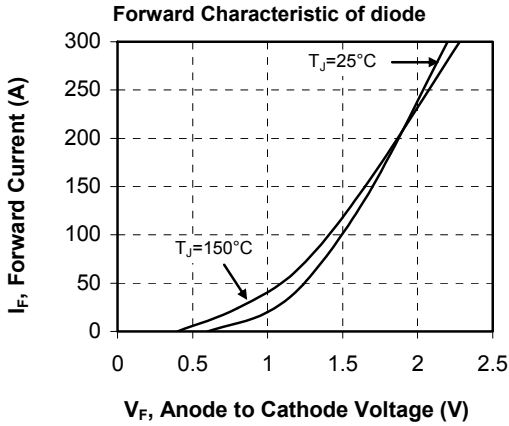


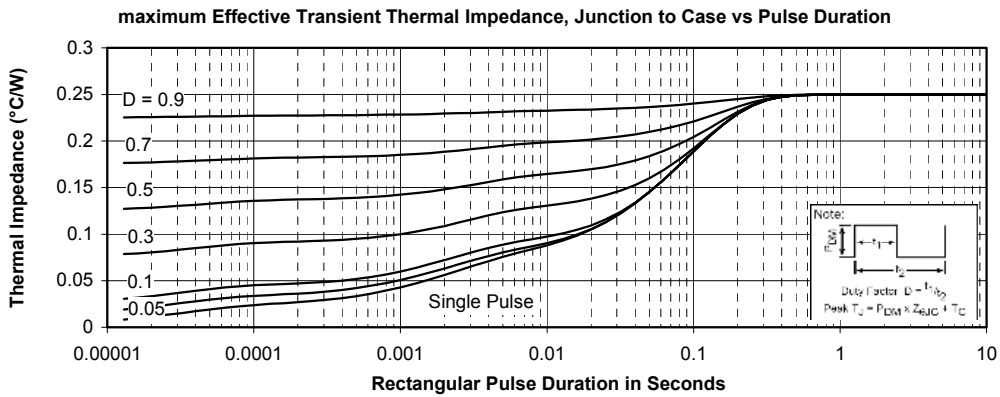
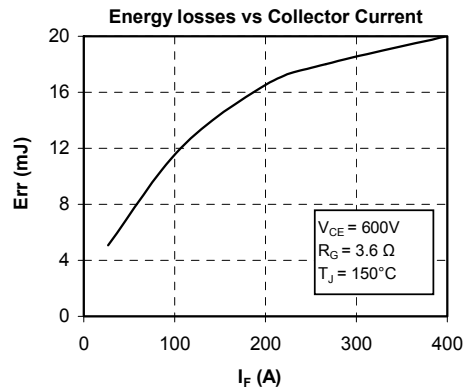
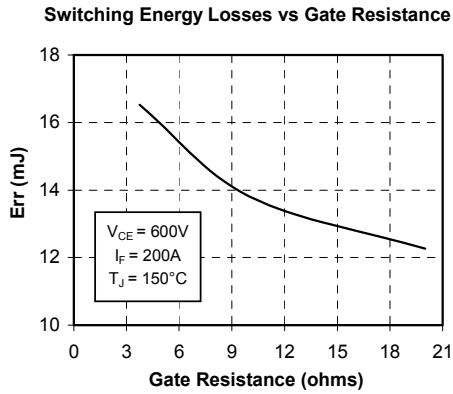
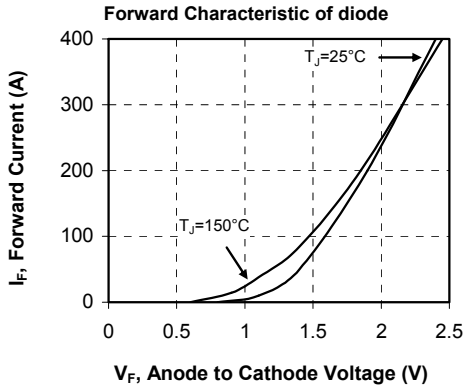
See application note APT0601 - Mounting Instructions for SP6 Power Modules on www.microsemi.com

Q1 to Q4 Typical performance curve





CR1 to CR4 Typical performance curve


CR5 & CR6 Typical performance curve


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