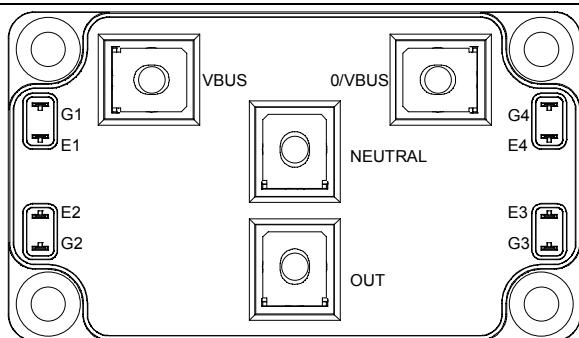
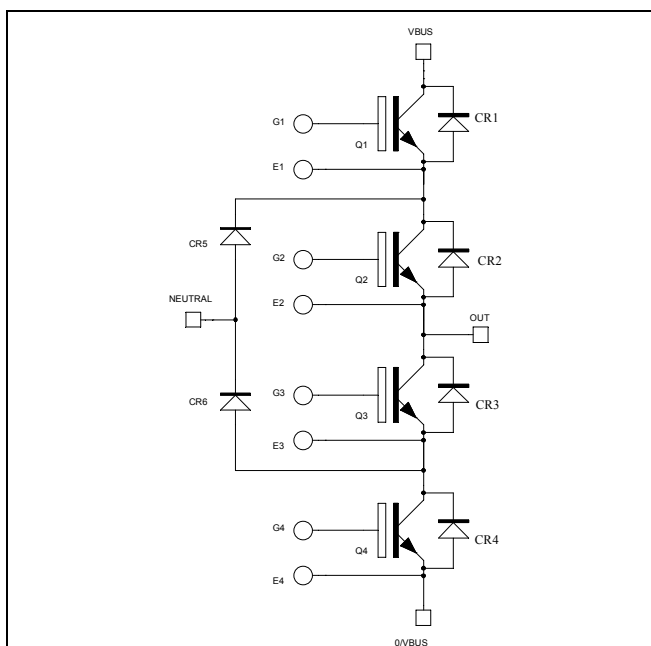


**Three level inverter
Trench + Field Stop IGBT3
Power Module**

**$V_{CES} = 650V$
 $I_C = 300A @ T_c = 80^\circ C$**


Application

- Solar converter
- Uninterruptible Power Supplies

Features

- Trench + Field Stop IGBT Technology
 - Low voltage drop
 - Low tail current
 - Switching frequency up to 20 kHz
 - Soft recovery parallel diodes
 - Low diode VF
 - Low leakage current
 - 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

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

Q1 to Q4 Absolute maximum ratings

Symbol	Parameter	Max ratings	Unit
V_{CES}	Collector - Emitter Breakdown Voltage	650	V
I_C	Continuous Collector Current	$T_c = 25^\circ C$	A
		$T_c = 80^\circ C$	
I_{CM}	Pulsed Collector Current	$T_c = 25^\circ C$	600
V_{GE}	Gate - Emitter Voltage	± 20	V
P_D	Maximum Power Dissipation	$T_c = 25^\circ C$	935
RBSOA	Reverse Bias Safe Operating Area	$T_j = 150^\circ C$	600A @ 600V



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

Q1 to Q4 Electrical Characteristics

Symbol	Characteristic	Test Conditions	Min	Typ	Max	Unit
I_{CES}	Zero Gate Voltage Collector Current	$V_{GE} = 0V, V_{CE} = 650V$			350	μA
$V_{CE(sat)}$	Collector Emitter Saturation Voltage	$V_{GE} = 15V$ $I_C = 300A$		1.5 1.7	1.9	V
$V_{GE(th)}$	Gate Threshold Voltage	$V_{GE} = V_{CE}, I_C = 5 mA$	5.0	5.8	6.5	V
I_{GES}	Gate – Emitter Leakage Current	$V_{GE} = 20V, V_{CE} = 0V$			800	nA

Q1 to Q4 Dynamic Characteristics

Symbol	Characteristic	Test Conditions	Min	Typ	Max	Unit
C_{ies}	Input Capacitance	$V_{GE} = 0V$		18.4		nF
C_{oes}	Output Capacitance	$V_{CE} = 25V$		1.16		
C_{res}	Reverse Transfer Capacitance	$f = 1MHz$		0.54		
Q_G	Gate charge	$V_{GE} = \pm 15V, I_C = 300A$ $V_{CE} = 300V$		3.2		μC
$T_{d(on)}$	Turn-on Delay Time	Inductive Switching (25°C) $V_{GE} = \pm 15V$ $V_{Bus} = 300V$ $I_C = 300A$ $R_G = 2.2\Omega$		115		ns
T_r	Rise Time			45		
$T_{d(off)}$	Turn-off Delay Time			225		
T_f	Fall Time			55		
$T_{d(on)}$	Turn-on Delay Time	Inductive Switching (150°C) $V_{GE} = \pm 15V$ $V_{Bus} = 300V$ $I_C = 300A$ $R_G = 2.2\Omega$		130		ns
T_r	Rise Time			50		
$T_{d(off)}$	Turn-off Delay Time			300		
T_f	Fall Time			70		
E_{on}	Turn on Energy	$V_{GE} = \pm 15V$ $V_{Bus} = 300V$ $I_C = 300A$	$T_j = 25^\circ C$ $T_j = 150^\circ C$	1.7 3		mJ
E_{off}	Turn off Energy	$R_G = 2.2\Omega$	$T_j = 25^\circ C$ $T_j = 150^\circ C$	8.2 10.6		
I_{sc}	Short Circuit data	$V_{GE} \leq 15V ; V_{Bus} = 360V$ $t_p \leq 6\mu s ; T_j = 150^\circ C$		1500		A
R_{thJC}	Junction to Case Thermal Resistance				0.16	$^\circ C/W$

CR1 to CR4 diode ratings and characteristics

Symbol	Characteristic	Test Conditions		Min	Typ	Max	Unit
V _{RRM}	Maximum Peak Repetitive Reverse Voltage			650			V
I _{RM}	Maximum Reverse Leakage Current	V _R =650V	T _j = 25°C T _j = 150°C			150 400	μA
I _F	DC Forward Current		T _c = 80°C		200		A
V _F	Diode Forward Voltage	I _F = 200A V _{GE} = 0V	T _j = 25°C T _j = 150°C		1.6 1.5	2	V
t _{rr}	Reverse Recovery Time	I _F = 200A V _R = 300V di/dt = 2800A/μs	T _j = 25°C T _j = 150°C		125 220		ns
Q _{rr}	Reverse Recovery Charge		T _j = 25°C T _j = 150°C		9.4 19.8		μC
E _{rr}	Reverse Recovery Energy		T _j = 25°C T _j = 150°C		2.2 4.8		mJ
R _{thJC}	Junction to Case Thermal Resistance					0.39	°C/W

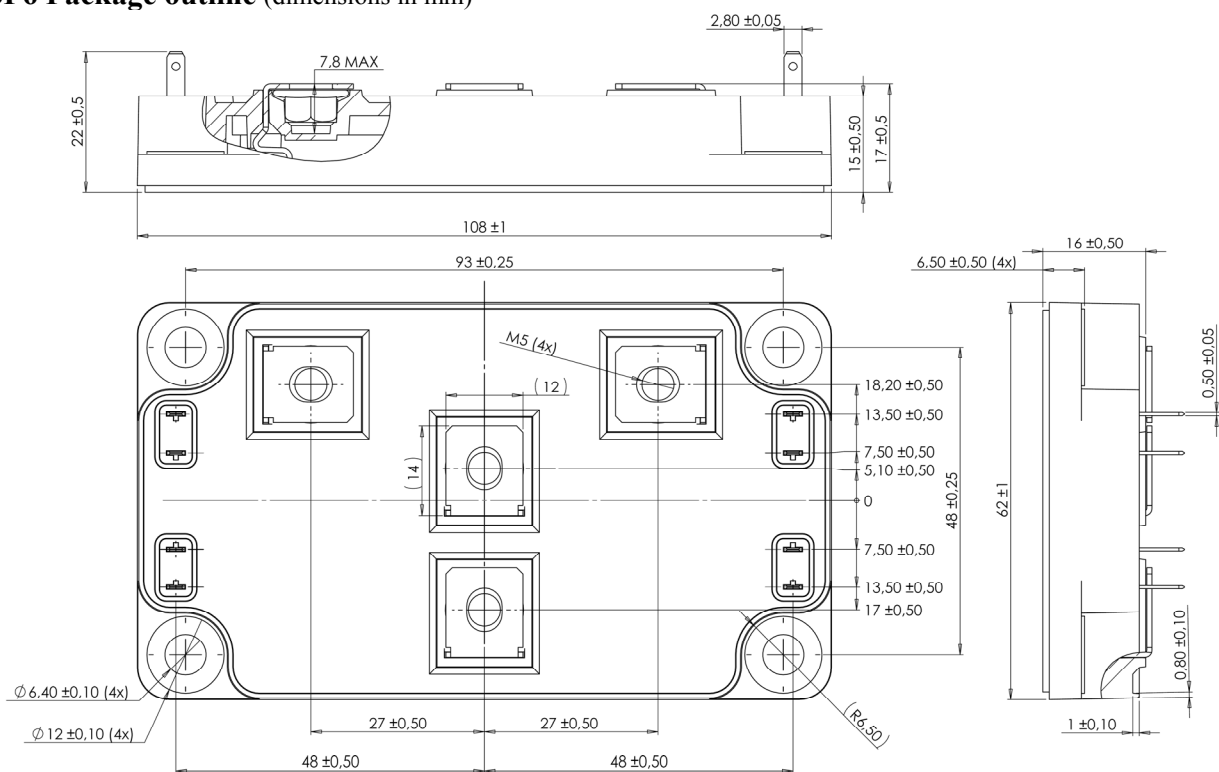
CR5 & CR6 diode ratings and characteristics

Symbol	Characteristic	Test Conditions		Min	Typ	Max	Unit
V _{RRM}	Maximum Peak Repetitive Reverse Voltage			650			V
I _{RM}	Maximum Reverse Leakage Current	V _R =650V	T _j = 25°C T _j = 150°C			150 400	μA
I _F	DC Forward Current		T _c = 80°C		300		A
V _F	Diode Forward Voltage	I _F = 300A V _{GE} = 0V	T _j = 25°C T _j = 150°C		1.6 1.5	2	V
t _{rr}	Reverse Recovery Time	I _F = 300A V _R = 300V di/dt = 4000A/μs	T _j = 25°C T _j = 150°C		130 225		ns
Q _{rr}	Reverse Recovery Charge		T _j = 25°C T _j = 150°C		13.7 29		μC
E _{rr}	Reverse Recovery Energy		T _j = 25°C T _j = 150°C		3.2 7		mJ
R _{thJC}	Junction to Case Thermal Resistance					0.29	°C/W

Thermal and package characteristics

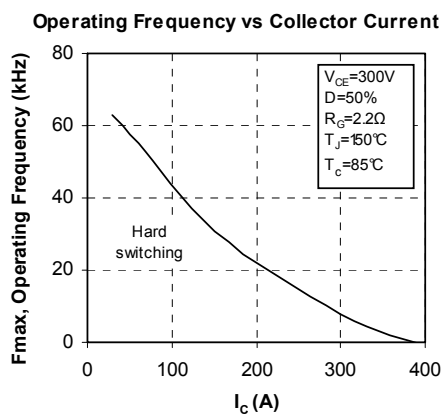
Symbol	Characteristic			Min	Typ	Max	Unit
V _{ISOL}	RMS Isolation Voltage, any terminal to case t = 1 min, 50/60Hz			4000			V
T _J	Operating junction temperature range			-40		175	°C
T _{STG}	Storage Temperature Range			-40		125	
T _C	Operating Case Temperature			-40		100	
Torque	Mounting torque	To heatsink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

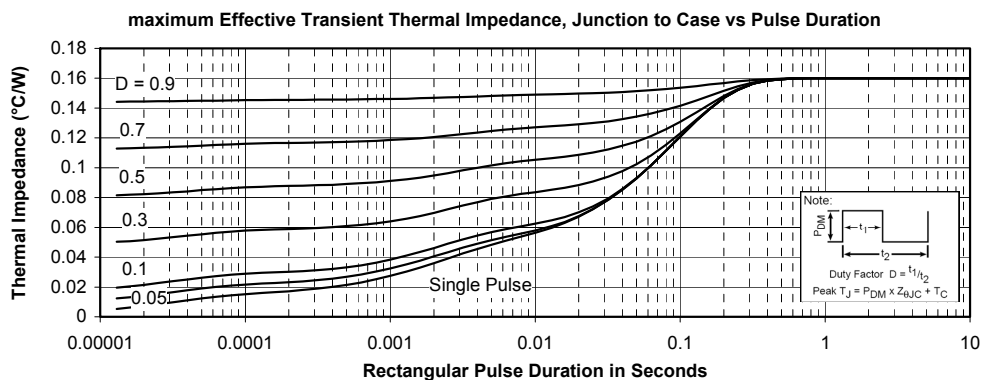
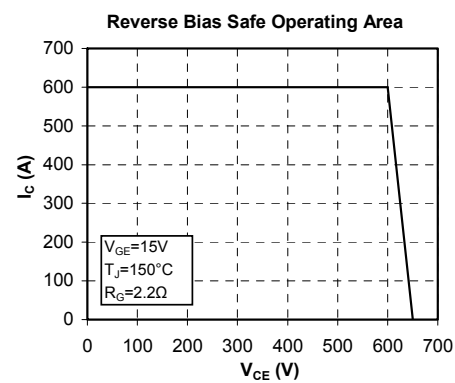
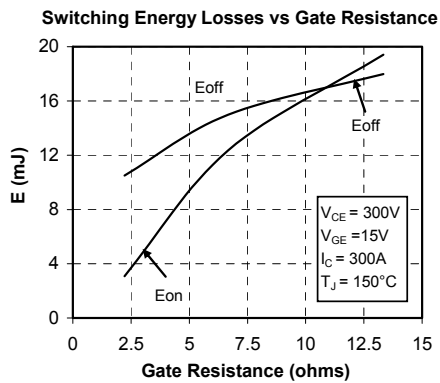
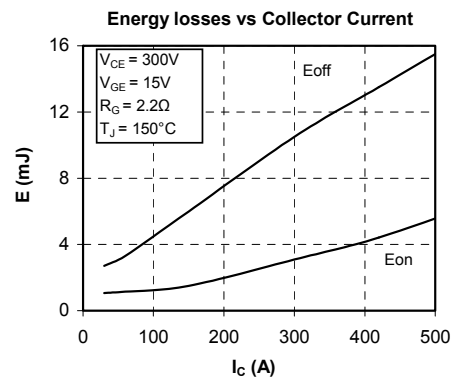
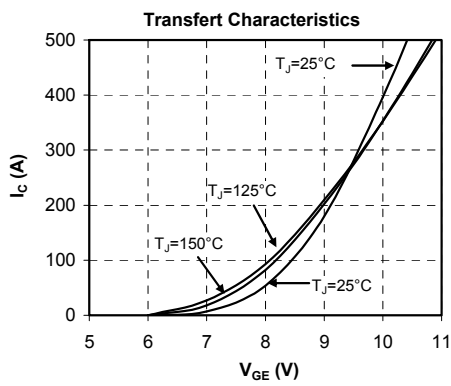
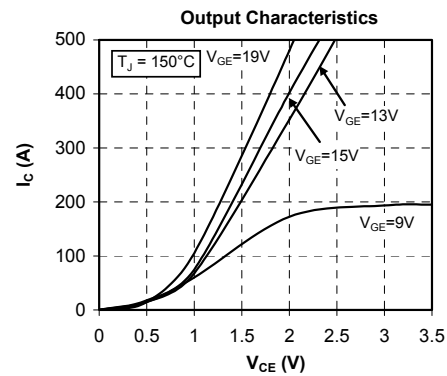
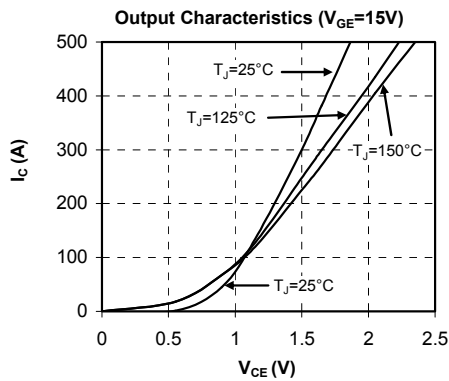
SP6 Package outline (dimensions in mm)



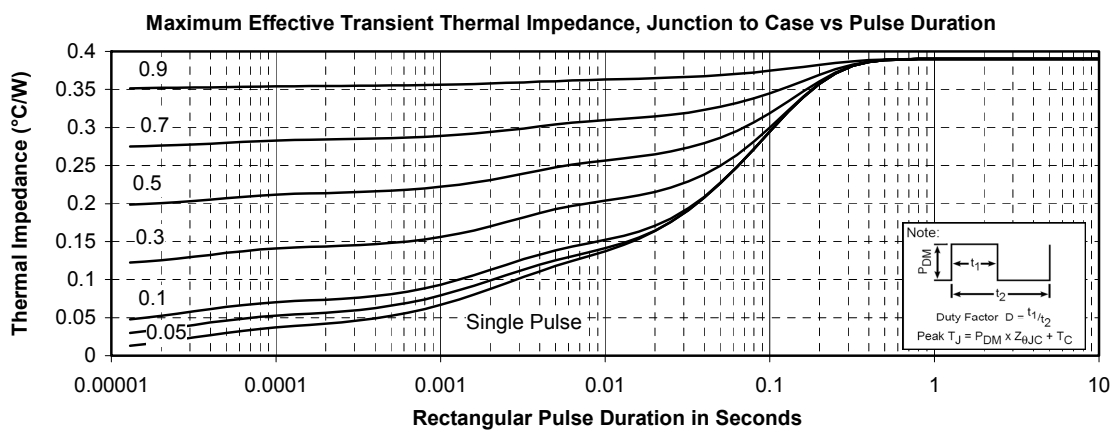
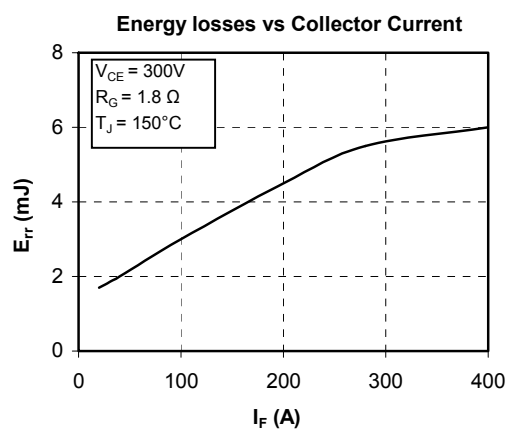
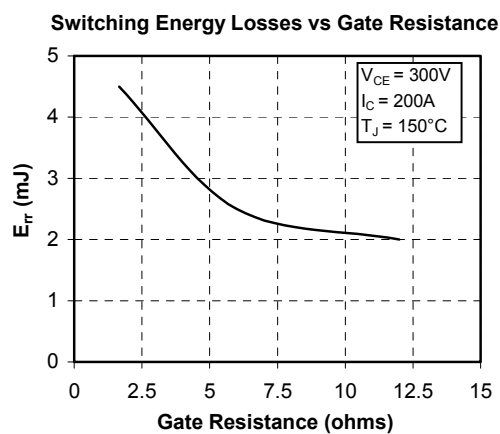
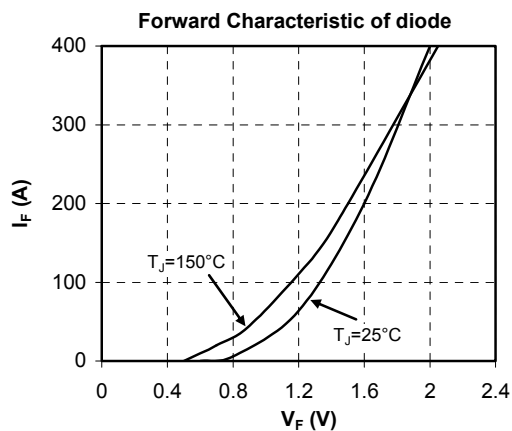
See application note APT0601 - Mounting Instructions for SP6 Power Modules on www.microsemi.com

Q1 to Q4 Typical performance curve

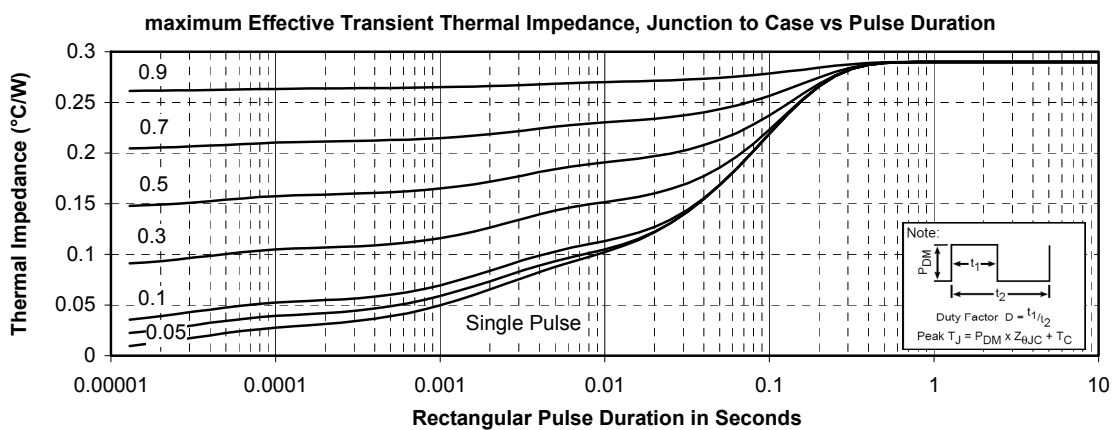
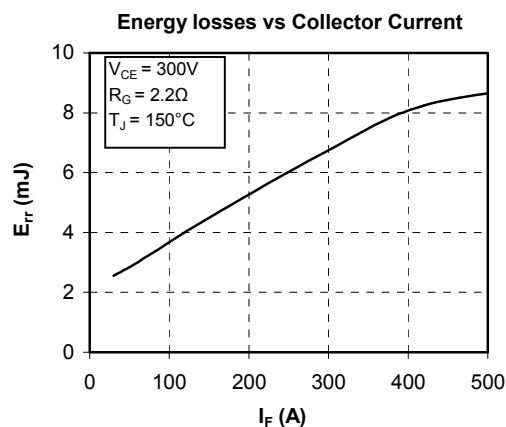
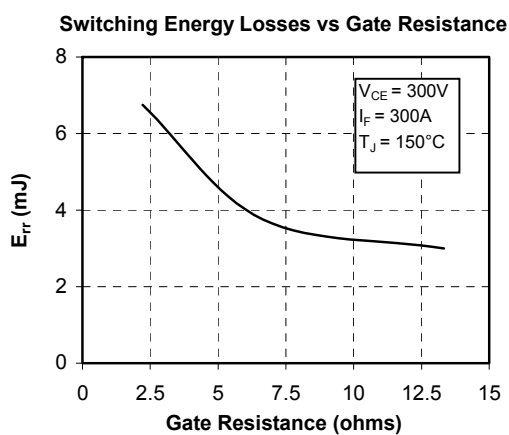
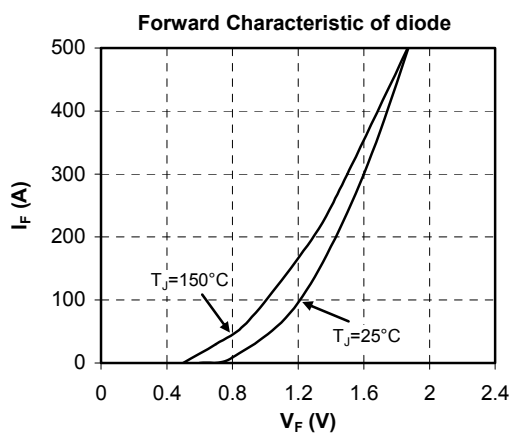




CR1 to CR4 Typical performance curve



CR5 & CR6 Typical performance curve



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