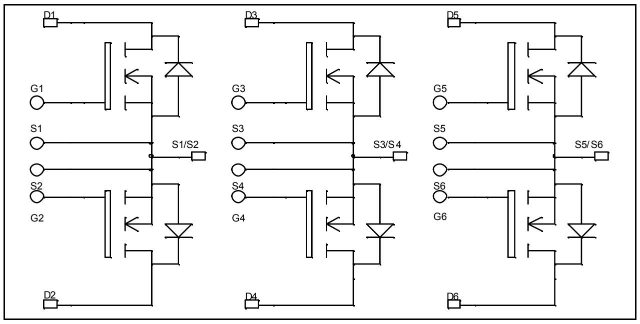
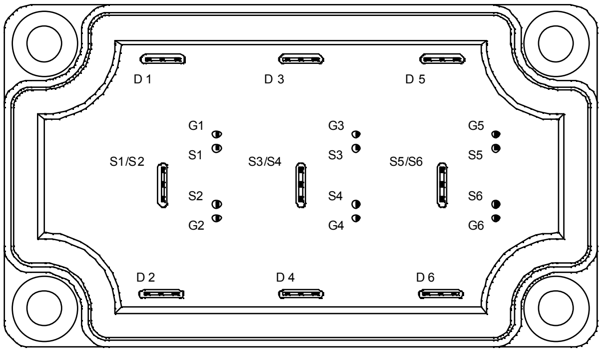
Microsemi
POWER PRODUCTS GROUP

APTC60TDUM35PG

Triple dual Common Source Super Junction MOSFET Power Module

$V_{DSS} = 600V$
$R_{DSon} = 35m\Omega$ max @ Tj = 25°C
$I_D = 72A$ @ Tc = 25°C





Application

- AC Switches
- Switched Mode Power Supplies
- Uninterruptible Power Supplies

Features

- COOLMOS Power Semiconductors
  - Ultra low R_{DSon}
  - Low Miller capacitance
  - Ultra low gate charge
  - Avalanche energy rated
  - Very rugged
- Kelvin source for easy drive
- Very low stray inductance
  - Symmetrical design
  - Lead frames for power connections
- High level of integration

Benefits

- Outstanding performance at high frequency operation
- Direct mounting to heatsink (isolated package)
- Low junction to case thermal resistance
- Solderable terminals both for power and signal for easy PCB mounting
- Very low (12mm) profile
- Each leg can be easily paralleled to achieve a dual common source configuration of three times the current capability
- RoHS Compliant

Absolute maximum ratings

Symbol	*Parameter*		*Max ratings*	*Unit*
V_{DSS}	Drain - Source Breakdown Voltage		600	V
I_D	Continuous Drain Current	$T_c = 25°C$	72	A
		$T_c = 80°C$	54	
I_{DM}	Pulsed Drain current		200	
V_{GS}	Gate - Source Voltage		±20	V
R_{DSon}	Drain - Source ON Resistance		35	mΩ
P_D	Maximum Power Dissipation	$T_c = 25°C$	416	W
I_{AR}	Avalanche current (repetitive and non repetitive)		20	A
E_{AR}	Repetitive Avalanche Energy		1	mJ
E_{AS}	Single Pulse Avalanche Energy		1800	

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

All ratings @ $T_j = 25°C$ unless otherwise specified

Electrical Characteristics

Symbol	*Characteristic*	*Test Conditions*		*Min*	*Typ*	*Max*	*Unit*
I_{DSS}	Zero Gate Voltage Drain Current	$V_{GS} = 0V, V_{DS} = 600V$	$T_j = 25°C$			40	µA
		$V_{GS} = 0V, V_{DS} = 600V$	$T_j = 125°C$			375	
$R_{DS(on)}$	Drain – Source on Resistance	$V_{GS} = 10V$, $I_D = 72A$				35	mΩ
$V_{GS(th)}$	Gate Threshold Voltage	$V_{GS} = V_{DS}$, $I_D = 5.4mA$		2.1	3	3.9	V
I_{GSS}	Gate – Source Leakage Current	$V_{GS} = \pm20$ V, $V_{DS} = 0V$				±150	nA

Dynamic Characteristics

Symbol	*Characteristic*	*Test Conditions*	*Min*	*Typ*	*Max*	*Unit*
C_{iss}	Input Capacitance	$V_{GS} = 0V$ $V_{DS} = 25V$ f = 1MHz		14		nF
C_{oss}	Output Capacitance			5.13		
C_{rss}	Reverse Transfer Capacitance			0.42		
Q_g	Total gate Charge	$V_{GS} = 10V$ $V_{Bus} = 300V$ $I_D = 72A$		518		nC
Q_{gs}	Gate – Source Charge			58		
Q_{gd}	Gate – Drain Charge			222		
$T_{d(on)}$	Turn-on Delay Time	**Inductive Switching @ 125°C** $V_{GS} = 15V$ $V_{Bus} = 400V$ $I_D = 72A$ $R_G = 2.5Ω$		21		ns
T_r	Rise Time			30		
$T_{d(off)}$	Turn-off Delay Time			283		
T_f	Fall Time			84		
E_{on}	Turn-on Switching Energy	**Inductive switching @ 25°C** $V_{GS} = 15V$, $V_{Bus} = 400V$ $I_D = 72A$, $R_G = 2.5Ω$		1340		µJ
E_{off}	Turn-off Switching Energy			1960		
E_{on}	Turn-on Switching Energy	**Inductive switching @ 125°C** $V_{GS} = 15V$, $V_{Bus} = 400V$ $I_D = 72A$, $R_G = 2.5Ω$		2192		µJ
E_{off}	Turn-off Switching Energy			2412		

Source - Drain diode ratings and characteristics

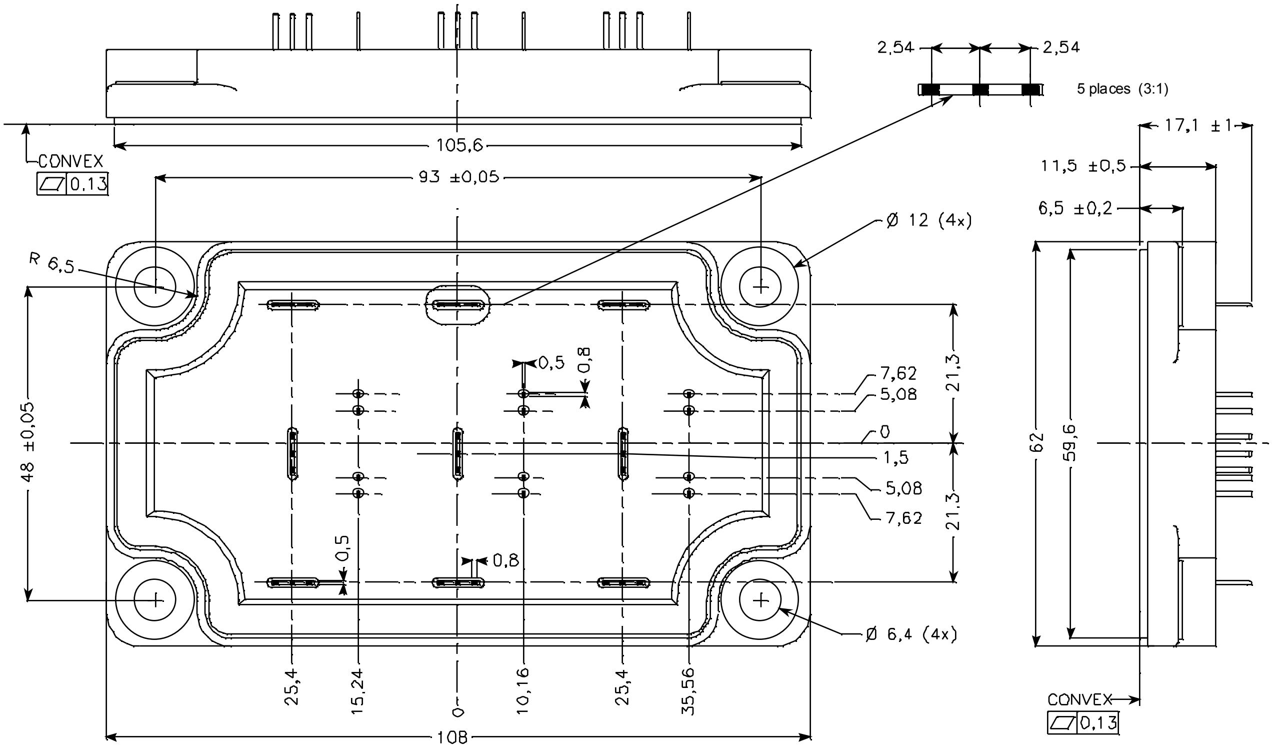
Symbol	*Characteristic*	*Test Conditions*		*Min*	*Typ*	*Max*	*Unit*
I_S	Continuous Source current (Body diode)		Tc = 25°C		72		A
			Tc = 80°C		54		
V_{SD}	Diode Forward Voltage	$V_{GS} = 0V$, $I_S = -72A$				1.2	V
dv/dt	Peak Diode Recovery ❶					6	V/ns
t_{rr}	Reverse Recovery Time	$I_S = -72A$ $V_R = 350V$ $di_S/dt = 200A/µs$	$T_j = 25°C$		580		ns
Q_{rr}	Reverse Recovery Charge		$T_j = 25°C$		46		µC

❶ dv/dt numbers reflect the limitations of the circuit rather than the device itself.
$I_S \leq -72A$ $di/dt \leq 200A/µs$ $V_R \leq V_{DSS}$ $T_j \leq 150°C$

Thermal and package characteristics

Symbol	*Characteristic*			*Min*	*Typ*	*Max*	*Unit*
R_{thJC}	Junction to Case Thermal Resistance					0.3	°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
Wt	Package Weight					250	g

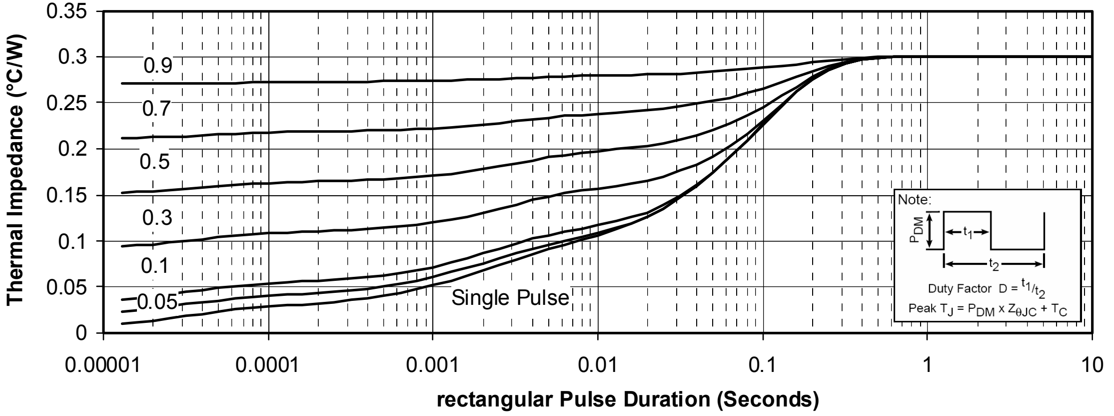
SP6-P Package outline (dimensions in mm)



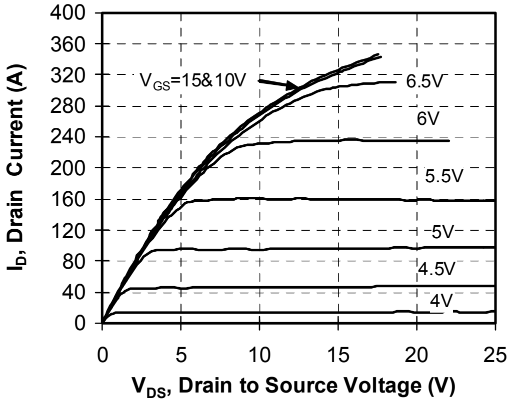
See application note 1902 - Mounting Instructions for SP6-P (12mm) Power Modules on www.microsemi.com

Typical Performance Curve

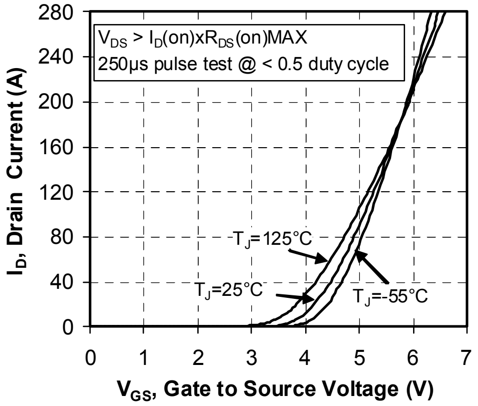
Maximum Effective Transient Thermal Impedance, Junction to Case vs Pulse Duration



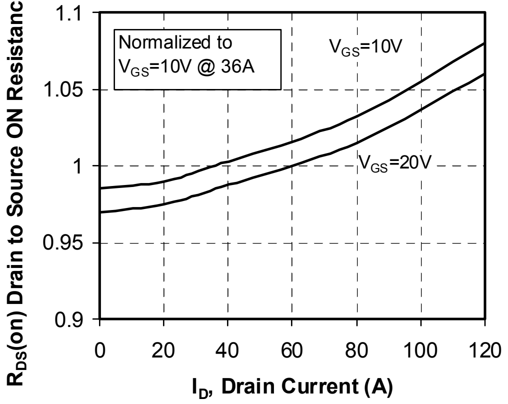
Low Voltage Output Characteristics



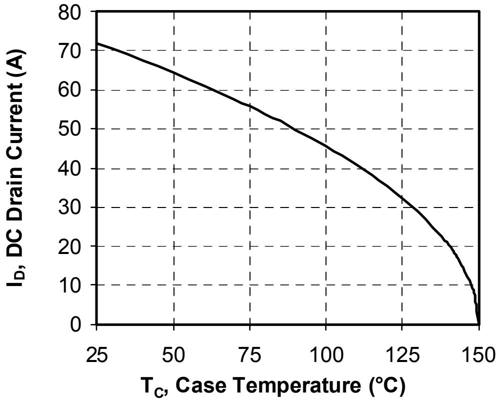
Transfert Characteristics

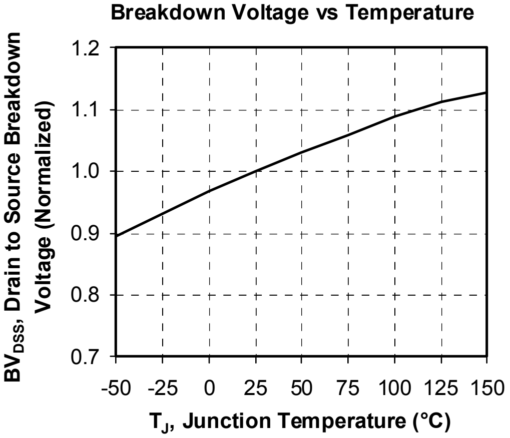


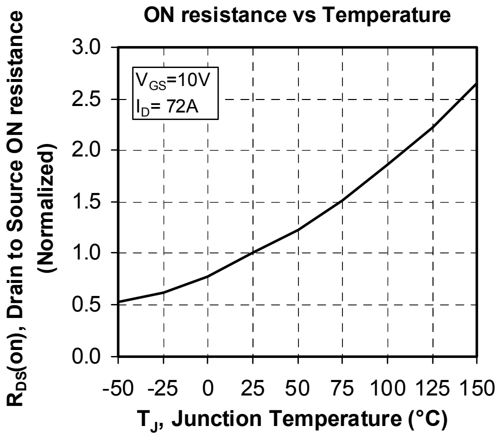
R_{DS}(on) vs Drain Current

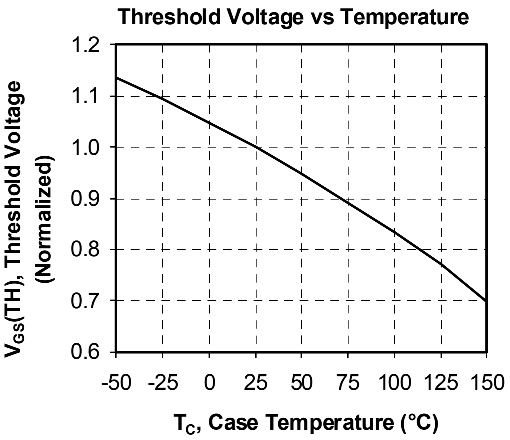


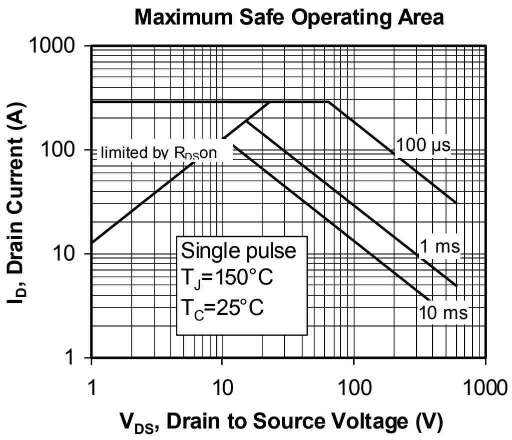
DC Drain Current vs Case Temperature

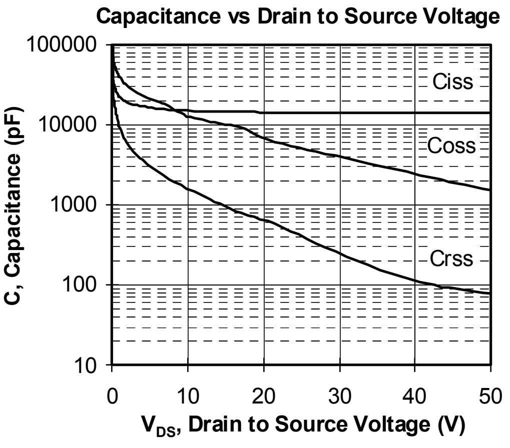


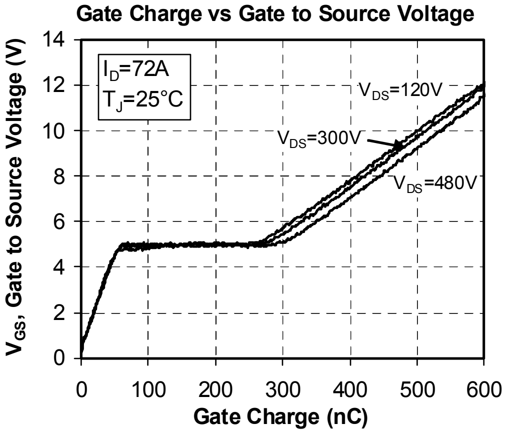

Breakdown Voltage vs Temperature


ON resistance vs Temperature

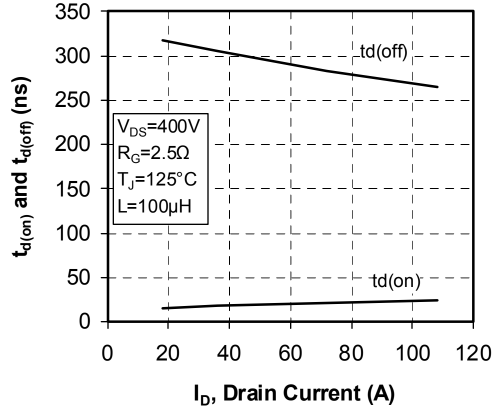

Threshold Voltage vs Temperature


Maximum Safe Operating Area

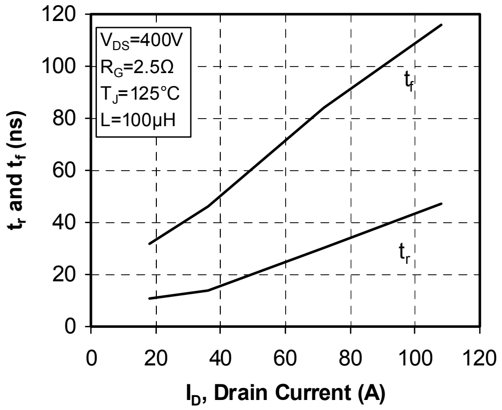

Capacitance vs Drain to Source Voltage


Gate Charge vs Gate to Source Voltage

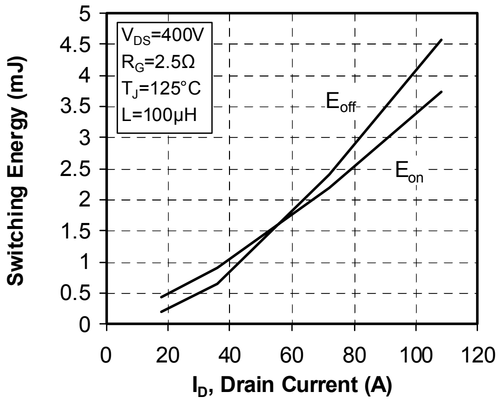
Delay Times vs Current



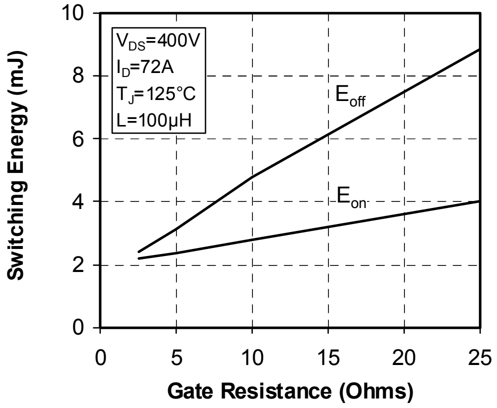
Rise and Fall times vs Current



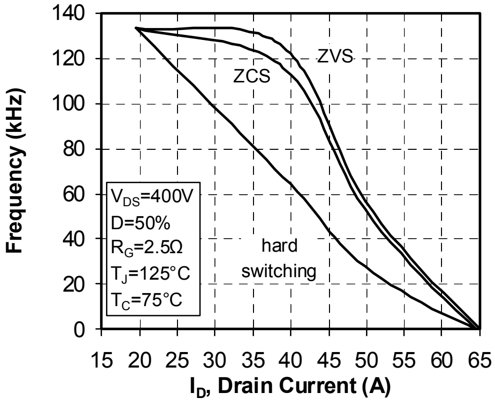
Switching Energy vs Current



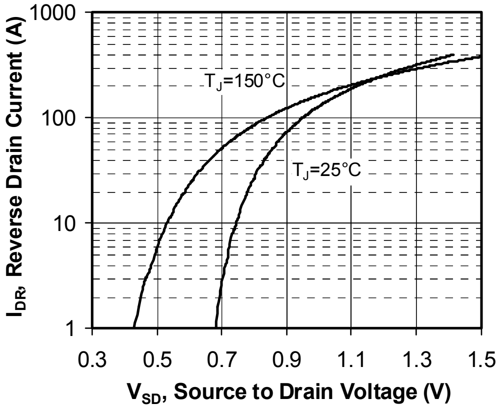
Switching Energy vs Gate Resistance



Operating Frequency vs Drain Current



Source to Drain Diode Forward Voltage



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Microsemi's products are covered by one or more of U.S patents 4,895,810 5,045,903 5,089,434 5,182,234 5,019,522 5,262,336 6,503,786 5,256,583 4,748,103 5,283,202 5,231,474 5,434,095 5,528,058 and foreign patents. U.S and Foreign patents pending.