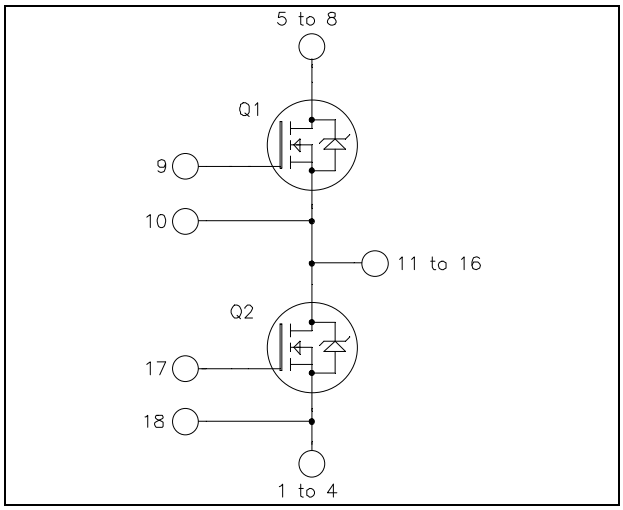
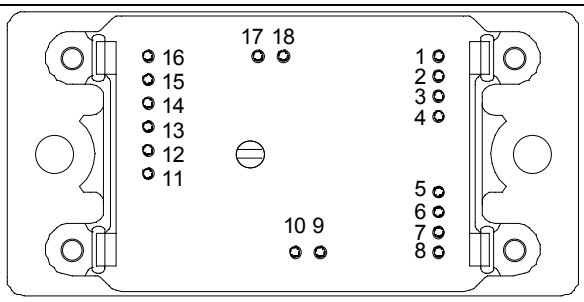
APTC60AM242G

Phase leg Super Junction MOSFET Power Module

V_{DSS} = 600V
R_{DSon} = 24mΩ max @ Tj = 25°C
I_D = 95A @ Tc = 25°C





Pins 1/2/3/4 ; 5/6/7/8 ; 11/12/13/14/15/16 must be shorted together

Application

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

Features

- CoolMOS™
  - Ultra low R_{DSon}
  - Low Miller capacitance
  - Ultra low gate charge
  - Avalanche energy rated
  - Very rugged
- Very low stray inductance
- Kelvin source for easy drive
- High level of integration

Benefits

- Outstanding performance at high frequency operation
- Direct mounting to heatsink (isolated package)
- Low junction to case thermal resistance
- Low profile
- RoHS Compliant

All ratings @ T_j = 25°C unless otherwise specified

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	95	A
		T_c = 80°C	70	
I_{DM}	Pulsed Drain current		260	
V_{GS}	Gate - Source Voltage		±20	V
R_{DSon}	Drain - Source ON Resistance		24	mΩ
P_D	Maximum Power Dissipation	T_c = 25°C	462	W
I_{AR}	Avalanche current (repetitive and non repetitive)		15	A
E_{AR}	Repetitive Avalanche Energy		3	mJ
E_{AS}	Single Pulse Avalanche Energy		1900	

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

Electrical Characteristics

Symbol	Characteristic	Test Conditions	Min	Typ	Max	Unit
I_{DSS}	Zero Gate Voltage Drain Current	V_{GS} = 0V,V_{DS} = 600V			350	µA
$R_{DS(on)}$	Drain – Source on Resistance	V_{GS} = 10V, I_D = 47.5A			24	mΩ
$V_{GS(th)}$	Gate Threshold Voltage	V_{GS} = V_{DS}, I_D = 5mA	2.1	3	3.9	V
I_{GSS}	Gate – Source Leakage Current	V_{GS} = ±20 V, V_{DS} = 0V			200	nA

Dynamic Characteristics

Symbol	Characteristic	Test Conditions		Min	Typ	Max	Unit
C_{iss}	Input Capacitance	V_{GS} = 0V ; V_{DS} = 25V f = 1MHz			14.4		nF
C_{oss}	Output Capacitance				17		
Q_g	Total gate Charge	V_{GS} = 10V V_{Bus} = 300V I_D = 95A			300		nC
Q_{gs}	Gate – Source Charge				68		
Q_{gd}	Gate – Drain Charge				102		
$T_{d(on)}$	Turn-on Delay Time	**Inductive Switching (125°C)** V_{GS} = 10V V_{Bus} = 400V I_D = 95A R_G = 2.5Ω			21		ns
T_r	Rise Time				30		
$T_{d(off)}$	Turn-off Delay Time				100		
T_f	Fall Time				45		
E_{off}	Turn-off Switching Energy	**Inductive switching** V_{GS} = 10V ; V_{Bus} = 400V I_D = 95A ; R_G = 2.5Ω	T_j = 25°C		1040		µJ
			T_j = 125°C		1270		
R_{thJC}	Junction to Case Thermal Resistance					0.27	°C/W

Source - Drain diode ratings and characteristics

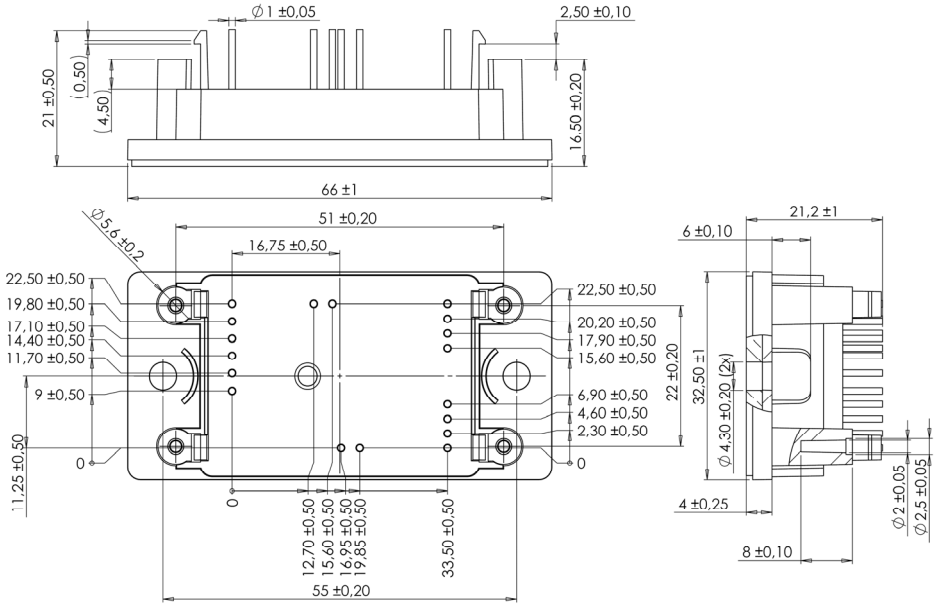
Symbol	Characteristic	Test Conditions		Min	Typ	Max	Unit
I_S	Continuous Source current (Body diode)		Tc = 25°C		95		A
			Tc = 80°C		70		
V_{SD}	Diode Forward Voltage	V_{GS} = 0V, I_S = - 95A				1.2	V
dv/dt	Peak Diode Recovery ❶					4	V/ns
t_{rr}	Reverse Recovery Time	I_S = - 95A V_R = 350V di_S/dt = 200A/µs	T_j = 25°C		600		ns
Q_{rr}	Reverse Recovery Charge		T_j = 25°C		34		µC

❶ dv/dt numbers reflect the limitations of the circuit rather than the device itself.
$I_S \le$ - 95A di/dt ≤ 200A/µs $V_R \le V_{DSS}$ $T_j \le$ 150°C

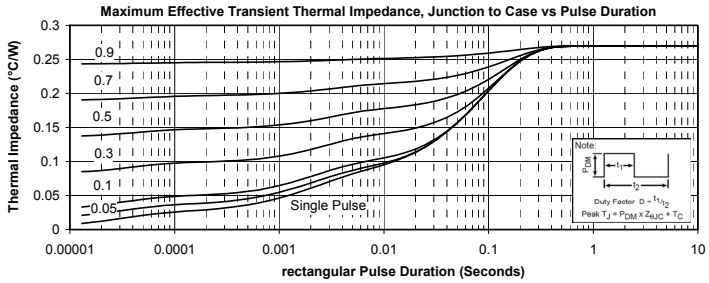
Thermal and package characteristics

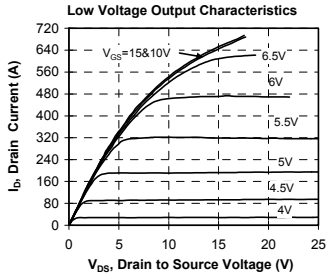
Symbol	Characteristic			Min	Typ	Max	Unit
V_{ISOL}	RMS Isolation Voltage, any terminal to case t =1 min, 50/60Hz			4000			V
T_J	Operating junction temperature range			-40		150	°C
T_{STG}	Storage Temperature Range			-40		125	
T_C	Operating Case Temperature			-40		100	
Torque	Mounting torque	To heatsink	M4	2		3	N.m
Wt	Package Weight					75	g

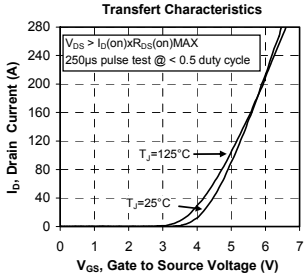
SP2 Package outline (dimensions in mm)

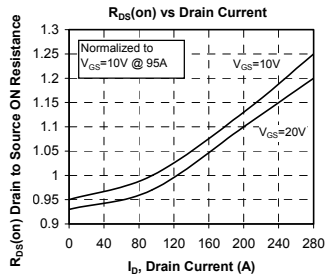


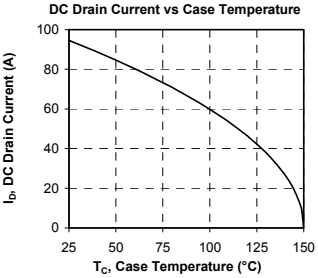
Typical Performance Curve

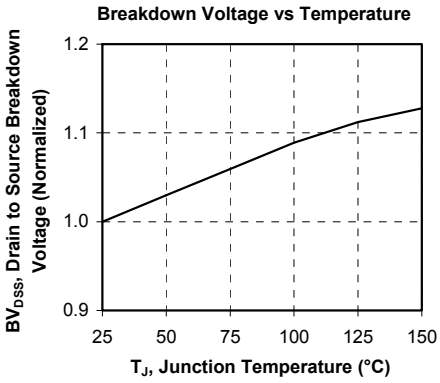


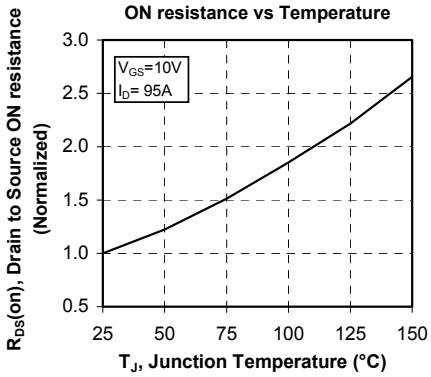


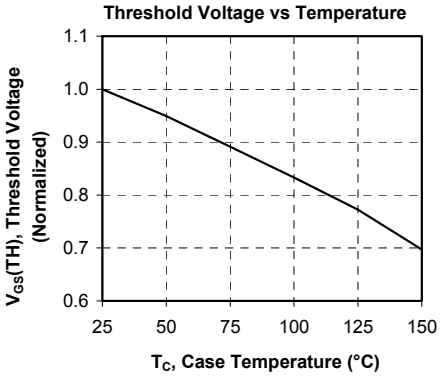


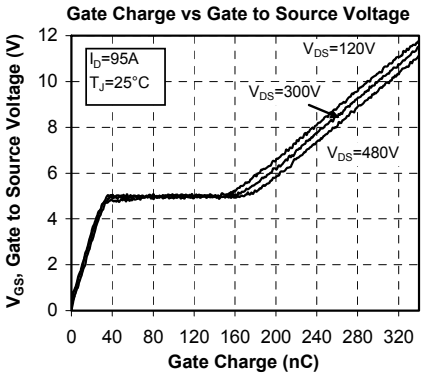


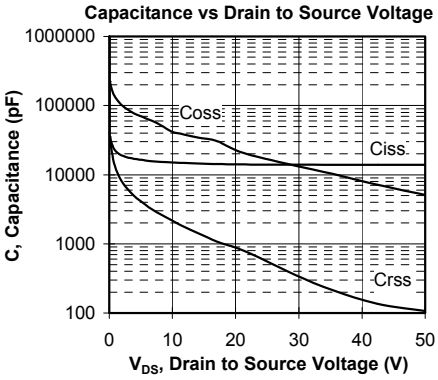



Breakdown Voltage vs Temperature
BVDSS, Drain to Source Breakdown Voltage (Normalized)
1.2
1.1
1.0
0.9
25
50
75
100
125
150
TJ, Junction Temperature (°C)

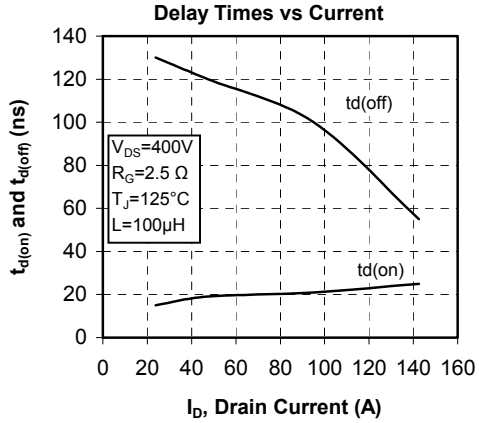

ON resistance vs Temperature
RDS(on), Drain to Source ON resistance (Normalized)
VGS=10V
ID= 95A
3.0
2.5
2.0
1.5
1.0
0.5
25
50
75
100
125
150
TJ, Junction Temperature (°C)


Threshold Voltage vs Temperature
VGS(TH), Threshold Voltage (Normalized)
1.1
1.0
0.9
0.8
0.7
0.6
25
50
75
100
125
150
TC, Case Temperature (°C)

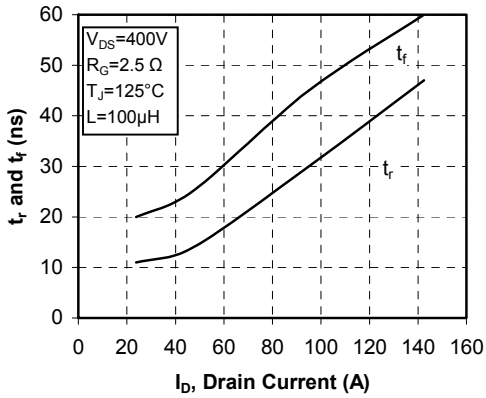

Gate Charge vs Gate to Source Voltage
VGS, Gate to Source Voltage (V)
ID=95A
TJ=25°C
VDS=120V
VDS=300V
VDS=480V
12
10
8
6
4
2
0
0
40
80
120
160
200
240
280
320
Gate Charge (nC)


Capacitance vs Drain to Source Voltage
C, Capacitance (pF)
1000000
100000
10000
1000
100
Coss
Ciss
Crss
0
10
20
30
40
50
VDS, Drain to Source Voltage (V)

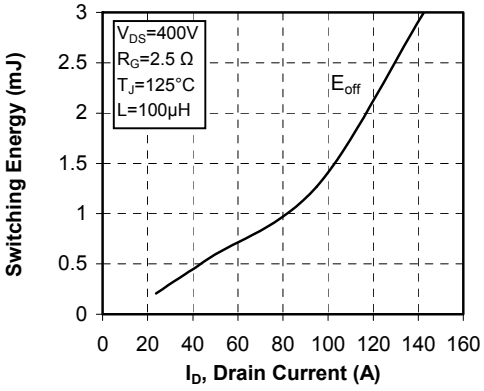
Delay Times vs Current



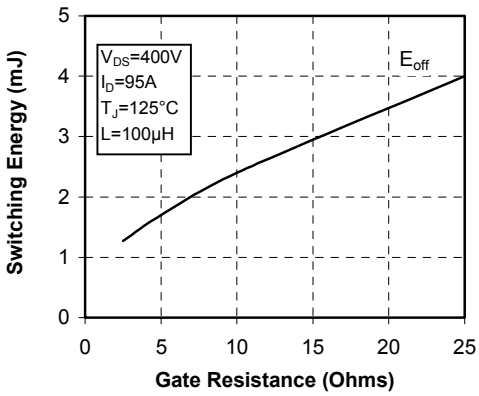
Rise and Fall times vs Current



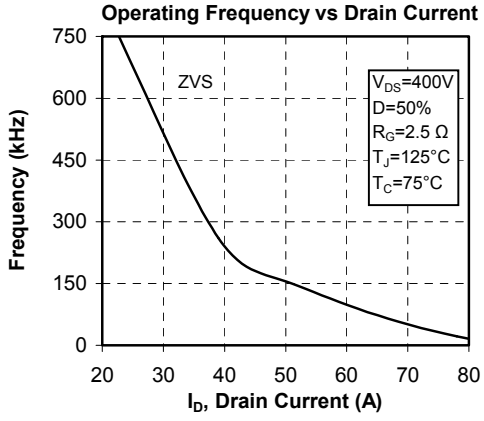
Switching Energy vs Current



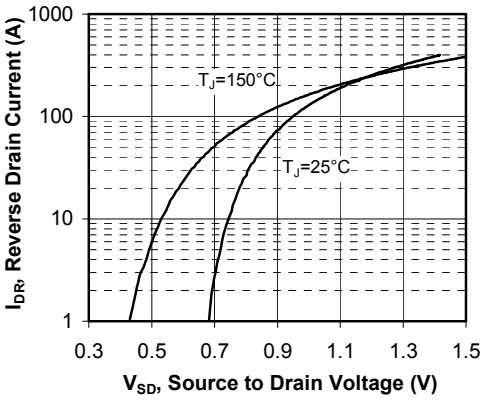
Switching Energy vs Gate Resistance



Operating Frequency vs Drain Current



Source to Drain Diode Forward Voltage



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