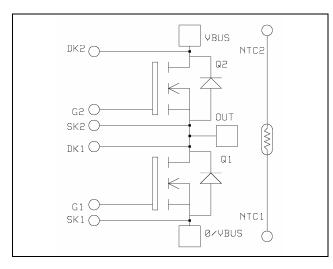
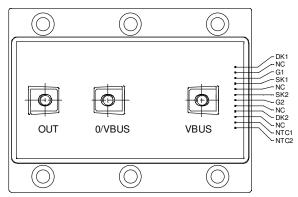


# APTM50AM25FT

Phase leg MOSFET Power Module





### Absolute maximum ratings

# $$\begin{split} V_{DSS} &= 500V \\ R_{DSon} &= 25m\Omega \ max \ @ \ Tj = 25^{\circ}C \\ I_{D} &= 149A \ @ \ Tc = 25^{\circ}C \end{split}$$

#### Application

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

#### Features

- Power MOS V<sup>®</sup> FREDFETs
  - Low R<sub>DSon</sub>
  - Low input and Miller capacitance
  - Low gate charge
  - Fast intrinsic diode
  - Avalanche energy rated
  - Very rugged
  - Kelvin source for easy drive
- Kelvin Drain for VDS monitoring
- Very low stray inductance
  - Symmetrical design
    - M5 power connectors
- Internal thermistor for temperature monitoring
- 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 for signal and M5 for power for easy PCB mounting

Symbol	Parameter		Max ratings	Unit
V <sub>DSS</sub>	Drain - Source Breakdown Voltage		500	V
т	Continuous Drain Current	$T_c = 25^{\circ}C$	149	
I <sub>D</sub>	Continuous Drani Current	$T_c = 80^{\circ}C$	111	А
I <sub>DM</sub>	Pulsed Drain current		450	
V <sub>GS</sub>	Gate - Source Voltage		±30	V
R <sub>DSon</sub>	Drain - Source ON Resistance		25	mΩ
P <sub>D</sub>	Maximum Power Dissipation $T_c = 25^{\circ}C$		1250	W
I <sub>AR</sub>	Avalanche current (repetitive and non repetitive)		149	А
E <sub>AR</sub>	Repetitive Avalanche Energy		30	mI
E <sub>AS</sub>	Single Pulse Avalanche Energy		1300	mJ

**CAUTION:** These Devices are sensitive to Electrostatic Discharge. Proper Handing Procedures Should Be Followed.



Electri	cal Characteristics	All ratings @ $T_i = 25^{\circ}C$ unless otherwise specified						
Symbol	Characteristic	Test Conditions	Min	Тур	Max	Unit		
BV <sub>DSS</sub>	Drain - Source Breakdown Voltage	$V_{GS} = 0V, I_D = 1mA$	500			V		
I <sub>DSS</sub>	Zero Gate Voltage Drain Current	$V_{GS} = 0V, V_{DS} = 500V$ $T_j = 25^{\circ}C$			1000			
		$V_{GS} = 0V, V_{DS} = 400V$ $T_j = 125^{\circ}C$			2500	μA		
R <sub>DS(on)</sub>	Drain – Source on Resistance	$V_{GS} = 10V, I_D = 74.5A$			25	mΩ		
V <sub>GS(th)</sub>	Gate Threshold Voltage	$V_{GS} = V_{DS}, I_D = 8mA$	2		4	V		
I <sub>GSS</sub>	Gate – Source Leakage Current	$V_{GS} = \pm 30 \text{ V}, V_{DS} = 0 \text{ V}$			±250	nA		

#### **Dynamic Characteristics**

Symbol	Characteristic	Test Conditions	Min	Тур	Max	Unit
C <sub>iss</sub>	Input Capacitance	$V_{GS} = 0V$		29.6		
C <sub>oss</sub>	Output Capacitance	$V_{\rm DS} = 25 V$		4.1		nF
C <sub>rss</sub>	Reverse Transfer Capacitance	f = 1MHz		1.6		
Qg	Total gate Charge	$V_{GS} = 10V$		1200		
Q <sub>gs</sub>	Gate – Source Charge	$V_{Bus} = 250V$		200		nC
$Q_{gd}$	Gate – Drain Charge	$I_{\rm D} = 149 {\rm A}$		560		
T <sub>d(on)</sub>	Turn-on Delay Time	<b>Resistive Switching</b> $V_{GS} = 15V$ $V_{GS} = 250V$		15		
T <sub>r</sub>	Rise Time			20		
T <sub>d(off)</sub>	Turn-off Delay Time	$V_{Bus} = 250V$ $I_D = 149A$		50		ns
$T_{\rm f}$	Fall Time	$R_{\rm G} = 0.22 \ \Omega$		10		

## Source - Drain diode ratings and characteristics

Symbol	Characteristic	Test Conditions		Min	Тур	Max	Unit
Is	Continuous Source current		$Tc = 25^{\circ}C$			149	А
	(Body diode)		$Tc = 80^{\circ}C$			111	Π
V <sub>SD</sub>	Diode Forward Voltage	$V_{GS} = 0V, I_S = -149A$				1.3	V
dv/dt	Peak Diode Recovery <b>1</b>					5	V/ns
t <sub>rr</sub>	Reverse Recovery Time	$I_{S} = -149A$ $V_{R} = 250V$	$T_j = 25^{\circ}C$			250	ns
чт		$di_s/dt = 800A/\mu s$	$T_j = 125^{\circ}C$			500	115
	Devene Devene Change	$I_{s} = -149A$	$T_j = 25^{\circ}C$		10.4		
Q <sub>rr</sub>	Reverse Recovery Charge	$V_{R} = 250V$ $di_{s}/dt = 800A/\mu s$	$T_j = 125^{\circ}C$		36		μC

• dv/dt numbers reflect the limitations of the circuit rather than the device itself.  $I_S \le -149A$  di/dt  $\le 700A/\mu s$   $V_R \le V_{DSS}$   $T_j \le 150^{\circ}C$ 





#### Thermal and package characteristics

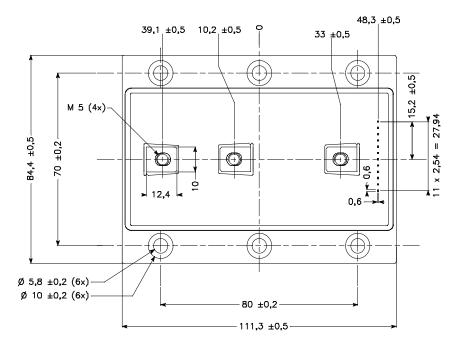
Symbol	Characteristic		Min	Тур	Max	Unit	
R <sub>thJC</sub>	Junction to Case					0.1	°C/W
V <sub>ISOL</sub>	RMS Isolation Voltage, any terminal to case t =1 min, I isol<1mA, 50/60Hz			2500			v
T <sub>J</sub>	Operating junction temperature range		-40		150		
T <sub>STG</sub>	Storage Temperature Range			-40		125	°C
T <sub>C</sub>	Operating Case Temperature			-40		100	
Torque	Mounting torque	To heatsink	M5	2		3.5	N.m
Torque	For terminals		M5	2		3.5	19.111
Wt	Package Weight					550	g

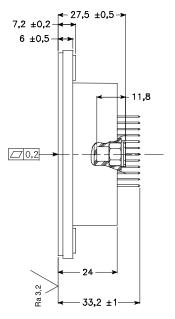
#### **Temperature sensor NTC**

Sym	ol Characteristic	Min	Тур	Max	Unit
<b>R</b> <sub>2</sub>	Resistance @ 25°C		68		kΩ
B 25	$_{5}$ T <sub>25</sub> = 298.16 K		4080		K
	P				

$$R_{T} = \frac{R_{25}}{\exp\left[B_{25/85}\left(\frac{1}{T_{25}} - \frac{1}{T}\right)\right]}$$
 T: Thermistor temperature  
R<sub>T</sub>: Thermistor value at T

#### **Package outline**





#### APT reserves the right to change, without notice, the specifications and information contained herein

APT'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. All Rights Reserved.