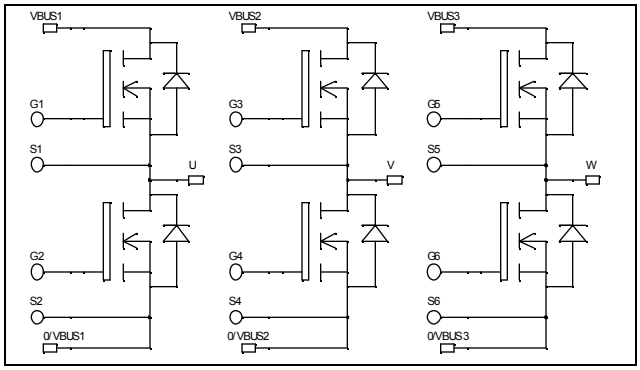
APTM08TAM04P

Triple phase leg MOSFET Power Module

V_{DSS} = 75V
R_{DSon} = 04mΩ max @ Tj = 25°C
I_D = 120A @ Tc = 25°C

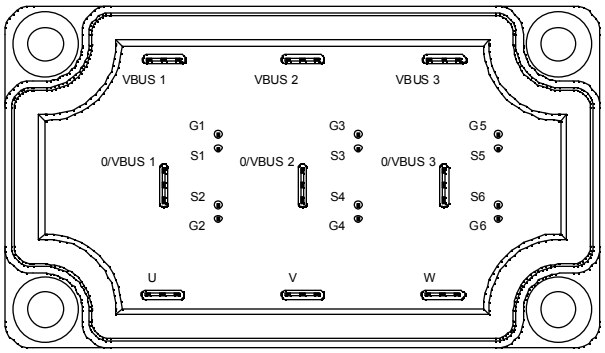


Application

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

Features

- Power MOSFETs
  - Low R_{DSon}
  - Low input and Miller capacitance
  - Low gate charge
  - Fast intrinsic diode
  - 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 phase leg of three times the current capability
- Module can be configured as a three phase bridge
- Module can be configured as a boost followed by a full bridge

Absolute maximum ratings

Symbol	*Parameter*		*Max ratings*	*Unit*
V_{DSS}	Drain - Source Breakdown Voltage		75	V
I_D	Continuous Drain Current	T_c = 25°C	120	A
		T_c = 80°C	90	
I_{DM}	Pulsed Drain current		250	
V_{GS}	Gate - Source Voltage		±30	V
R_{DSon}	Drain - Source ON Resistance		04	mΩ
P_D	Maximum Power Dissipation	T_c = 25°C	138	W
I_{AR}	Avalanche current (repetitive and non repetitive)		75	A
E_{AR}	Repetitive Avalanche Energy		50	mJ
E_{AS}	Single Pulse Avalanche Energy		1500	

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

All ratings @ T_j = 25°C unless otherwise specified

Electrical Characteristics

Symbol	*Characteristic*	*Test Conditions*		*Min*	*Typ*	*Max*	*Unit*
BV_{DSS}	Drain - Source Breakdown Voltage	V_{GS} = 0V, I_D = 1mA		75			V
I_{DSS}	Zero Gate Voltage Drain Current	V_{GS} = 0V, V_{DS} = 75V	T_j = 25°C			100	µA
		V_{GS} = 0V, V_{DS} = 60V	T_j = 125°C			250	
$R_{DS(on)}$	Drain – Source on Resistance	V_{GS} = 10V, I_D = 60A				04	mΩ
$V_{GS(th)}$	Gate Threshold Voltage	V_{GS} = V_{DS}, I_D = 1mA		2		4	V
I_{GSS}	Gate – Source Leakage Current	V_{GS} = ±30 V, V_{DS} = 0V				±100	nA

Dynamic Characteristics

Symbol	*Characteristic*	*Test Conditions*	*Min*	*Typ*	*Max*	*Unit*
C_{iss}	Input Capacitance	V_{GS} = 0V V_{DS} = 25V f = 1MHz		4530		pF
C_{oss}	Output Capacitance			1080		
C_{rss}	Reverse Transfer Capacitance			450		
Q_g	Total gate Charge	V_{GS} = 10V V_{Bus} = 60V I_D =120A		153		nC
Q_{gs}	Gate – Source Charge			25		
Q_{gd}	Gate – Drain Charge			82		
$T_{d(on)}$	Turn-on Delay Time	**Inductive switching @ 125°C** V_{GS} = 15V V_{Bus} = 40V I_D = 120A R_G = 5Ω		35		ns
T_r	Rise Time			60		
$T_{d(off)}$	Turn-off Delay Time			100		
T_f	Fall Time			65		
E_{on}	Turn-on Switching Energy ❶	**Inductive switching @ 25°C** V_{GS} = 15V, V_{Bus} = 40V I_D = 120A, R_G = 5Ω		290		µJ
E_{off}	Turn-off Switching Energy ❷			317		
E_{on}	Turn-on Switching Energy ❶	**Inductive switching @ 125°C** V_{GS} = 15V, V_{Bus} = 40V I_D = 120A, R_G = 5Ω		319		µJ
E_{off}	Turn-off Switching Energy ❷			336		

Source - Drain diode ratings and characteristics

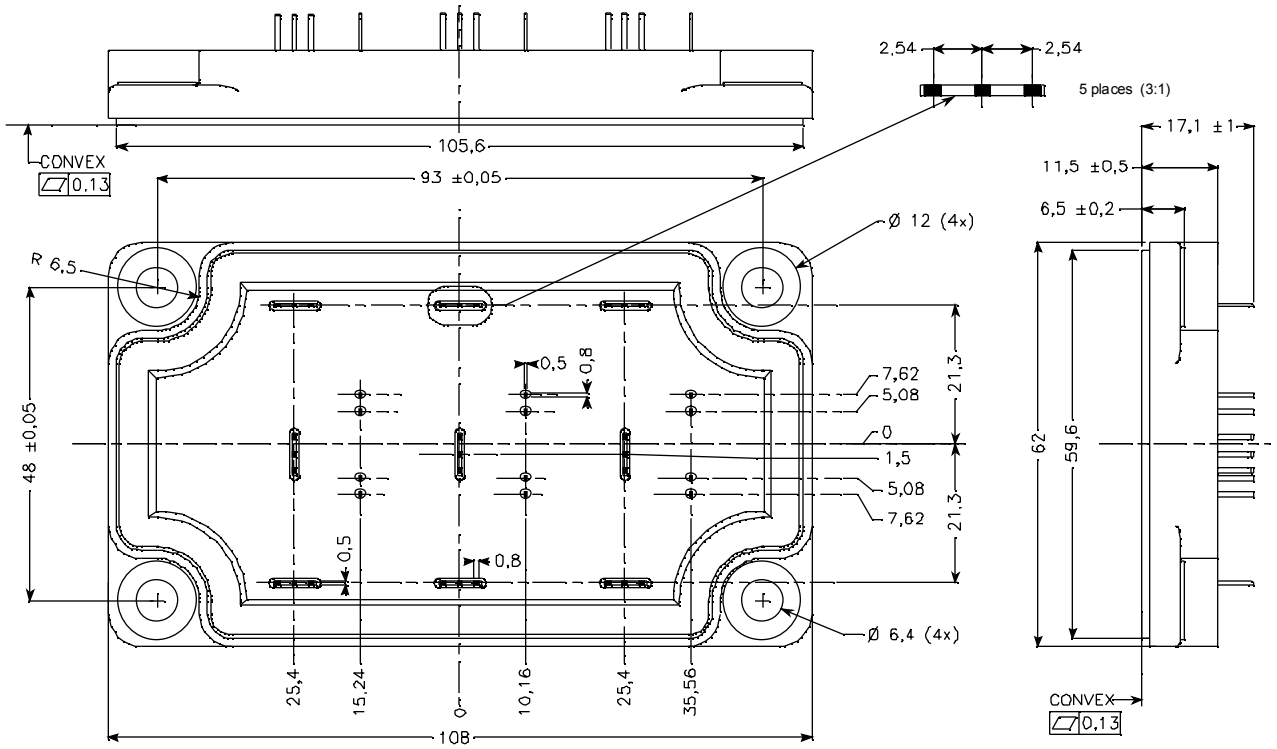
Symbol	*Characteristic*	*Test Conditions*		*Min*	*Typ*	*Max*	*Unit*
I_S	Continuous Source current (Body diode)		Tc = 25°C			120	A
			Tc = 80°C			90	
V_{SD}	Diode Forward Voltage	V_{GS} = 0V, I_S = - 120A				1.3	V
dv/dt	Peak Diode Recovery ❸					6	V/ns
t_{rr}	Reverse Recovery Time	I_S = - 120A V_R = 40V di_S/dt = 100A/µs	T_j = 25°C		100	200	ns
Q_{rr}	Reverse Recovery Charge		T_j = 25°C		300		nC

❶ E_{on} includes diode reverse recovery.
❷ In accordance with JEDEC standard JESD24-1.
❸ dv/dt numbers reflect the limitations of the circuit rather than the device itself.
$I_S \le$ - 120A di/dt ≤ 700A/µs $V_R \le V_{DSS}$ $T_j \le$ 150°C

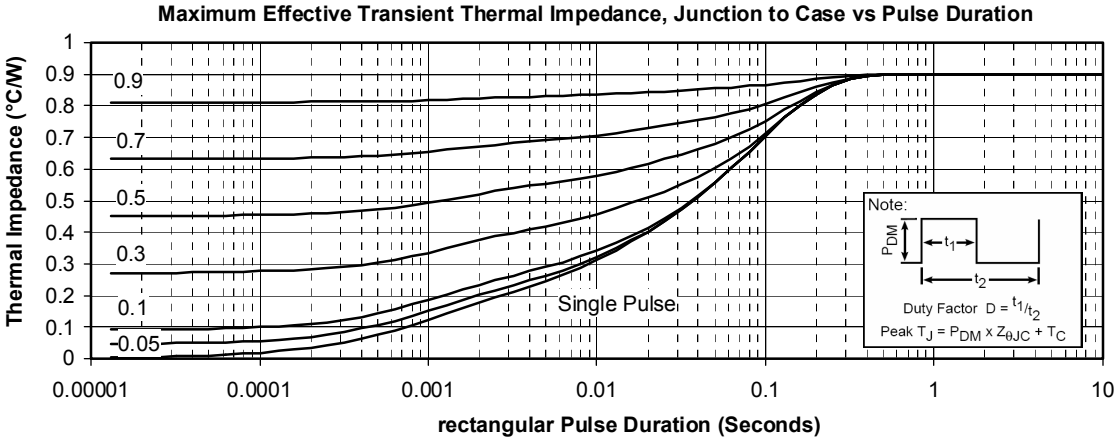
Thermal and package characteristics

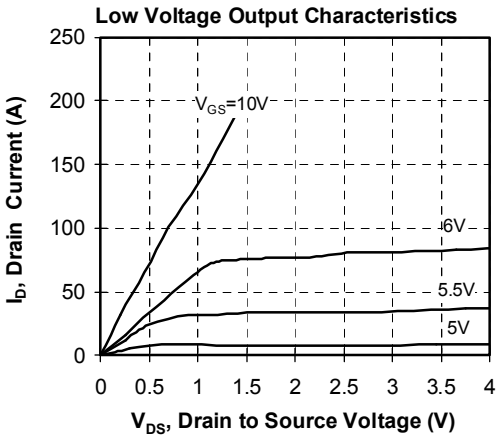
Symbol	*Characteristic*			*Min*	*Typ*	*Max*	*Unit*
R_{thJC}	Junction to Case		IGBT			0.9	°C/W
V_{ISOL}	RMS Isolation Voltage, any terminal to case t =1 min, I isol<1mA, 50/60Hz			2500			V
T_J	Operating junction temperature range			-40		150	°C
T_{STG}	Storage Temperature Range			-40		125	
T_C	Operating Case Temperature			-40		100	
Torque	Mounting torque	To heatsink	M6	3		5	N.m
Wt	Package Weight					250	g

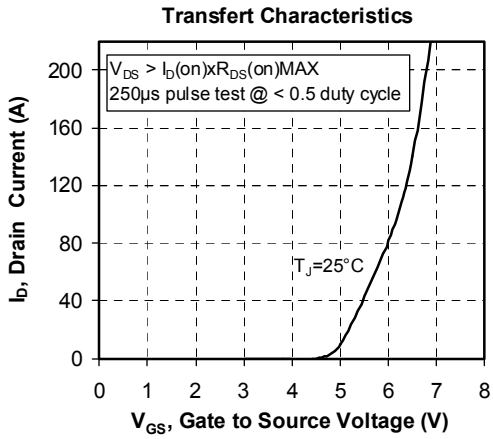
Package outline

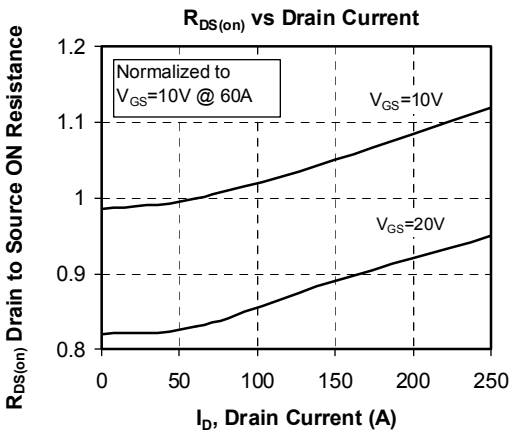


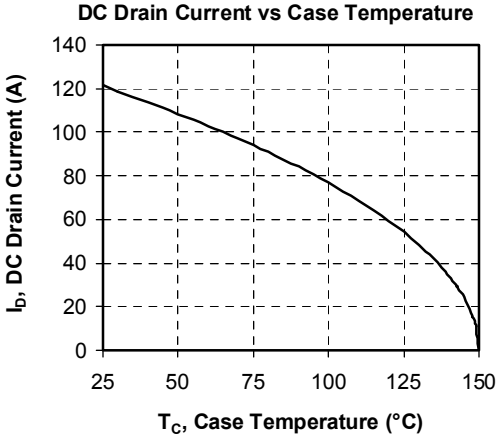
Typical Performance Curve



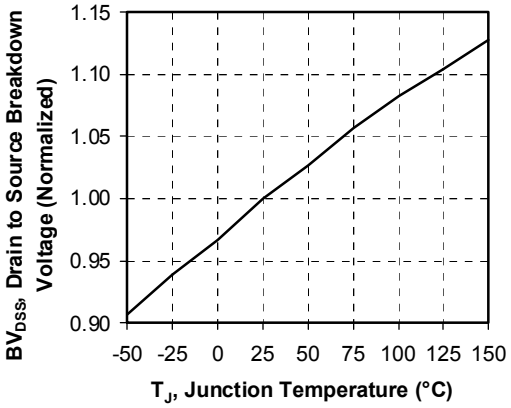




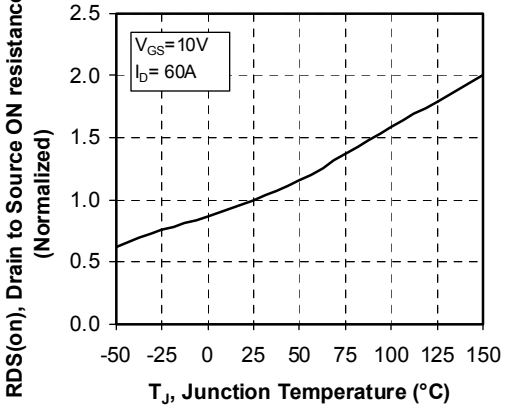




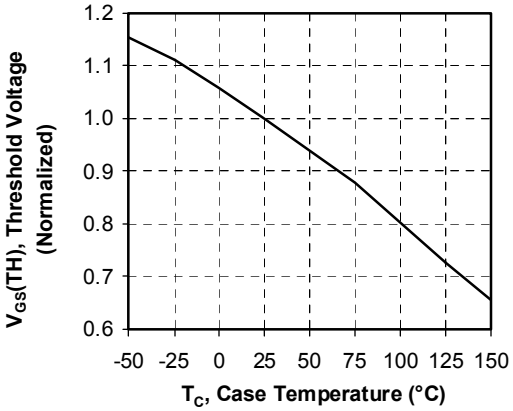
Breakdown Voltage vs Temperature



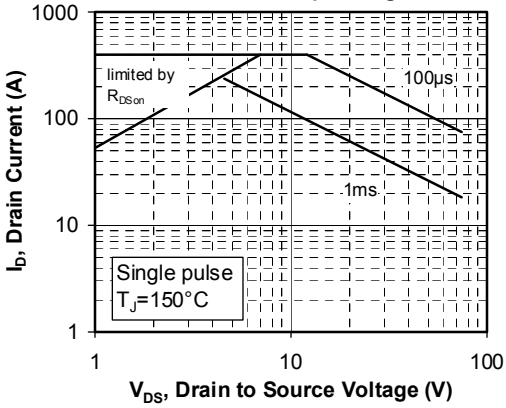
ON resistance vs Temperature



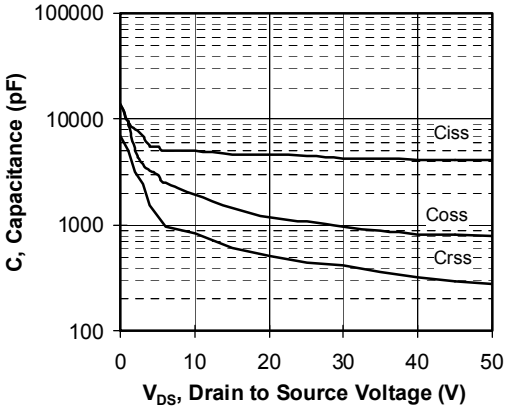
Threshold Voltage vs Temperature



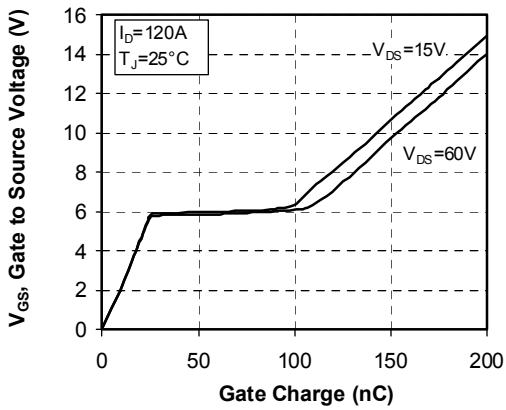
Maximum Safe Operating Area



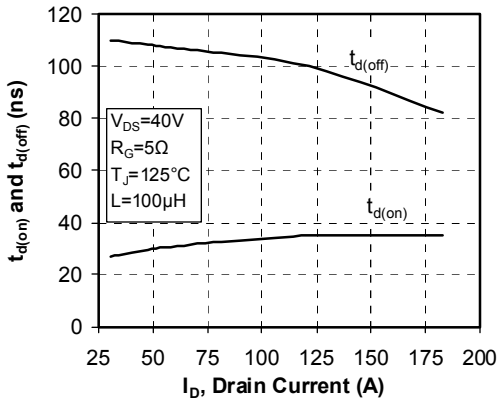
Capacitance vs Drain to Source Voltage



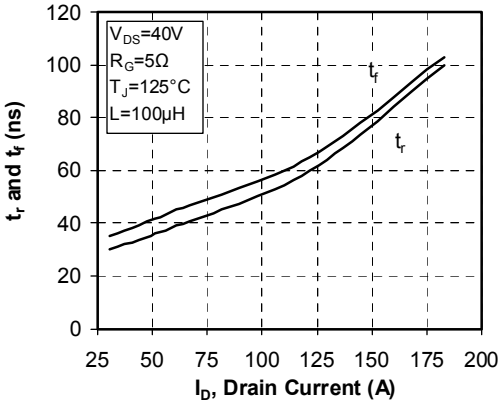
Gate Charge vs Gate to Source Voltage



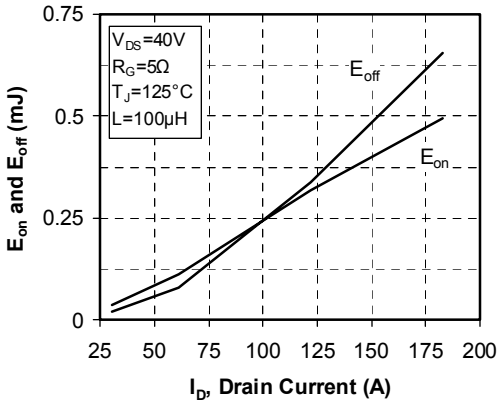
Delay Times vs Current



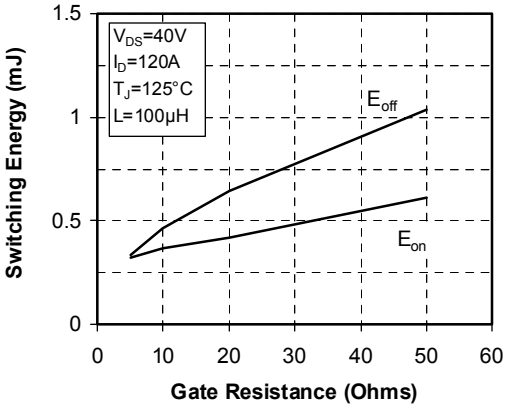
Rise and Fall times vs Current



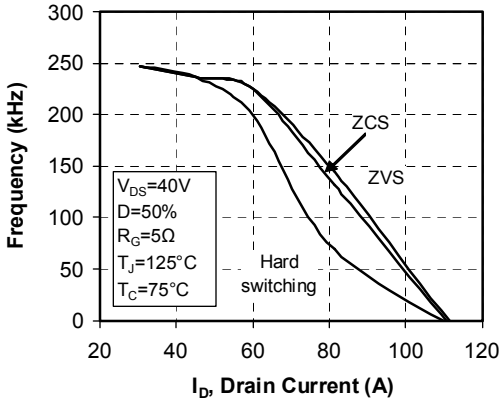
Switching Energy vs Current



Switching Energy vs Gate Resistance



Operating Frequency vs Drain Current



Source to Drain Diode Forward Voltage