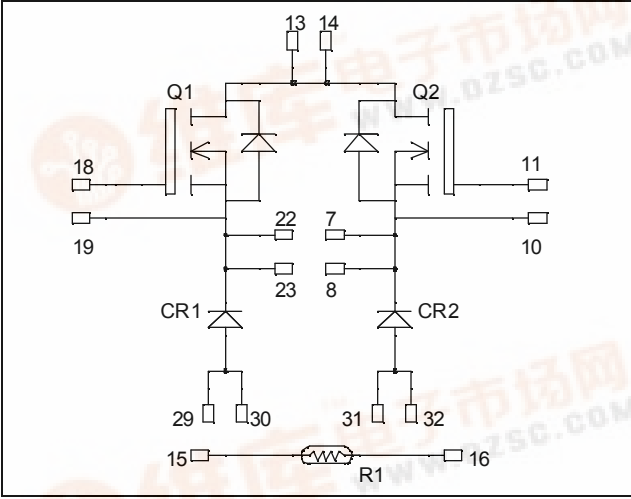




# APTC60DSKM35T3

## Dual buck chopper Super Junction MOSFET Power Module

$V_{DSS} = 600V$   
 $R_{DSon} = 35m\Omega \text{ max @ } T_j = 25^\circ C$   
 $I_D = 72A \text{ @ } T_c = 25^\circ C$

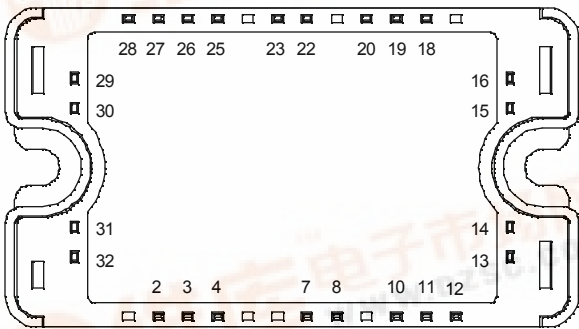


### Application

- AC and DC motor control
- Switched Mode 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
- 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 both for power and signal for easy PCB mounting
- Low profile
- Each leg can be easily paralleled to achieve a single buck of twice the current capability

All multiple inputs and outputs must be shorted together  
 Example: 13/14 ; 29/30 ; 22/23 ...

### Absolute maximum ratings

Symbol	Parameter	Max ratings	Unit
$V_{DSS}$	Drain - Source Breakdown Voltage	600	V
$I_D$	Continuous Drain Current	$T_c = 25^\circ C$	72
		$T_c = 80^\circ C$	54
$I_{DM}$	Pulsed Drain current	200	A
$V_{GS}$	Gate - Source Voltage	$\pm 20$	V
$R_{DSon}$	Drain - Source ON Resistance	35	$m\Omega$
$P_D$	Maximum Power Dissipation	$T_c = 25^\circ C$	416
$I_{AR}$	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 Handling Procedures Should Be Followed.

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

## Electrical Characteristics

Symbol	Characteristic	Test Conditions	Min	Typ	Max	Unit
$BV_{DSS}$	Drain - Source Breakdown Voltage	$V_{GS} = 0V, I_D = 375\mu A$	600			V
$I_{DSS}$	Zero Gate Voltage Drain Current	$V_{GS} = 0V, V_{DS} = 600V, T_j = 25^\circ\text{C}$		1	40	$\mu A$
		$V_{GS} = 0V, V_{DS} = 600V, T_j = 125^\circ\text{C}$			375	
$R_{DS(on)}$	Drain - Source on Resistance	$V_{GS} = 10V, I_D = 72A$			35	$m\Omega$
$V_{GS(th)}$	Gate Threshold Voltage	$V_{GS} = V_{DS}, I_D = 5.4mA$	2.1	3	3.9	V
$I_{GSS}$	Gate - Source Leakage Current	$V_{GS} = \pm 20V, V_{DS} = 0V$			$\pm 150$	nA

## Dynamic Characteristics

Symbol	Characteristic	Test Conditions	Min	Typ	Max	Unit
$C_{iss}$	Input Capacitance	$V_{GS} = 0V$		14		nF
$C_{oss}$	Output Capacitance	$V_{DS} = 25V$		5.13		
$C_{rss}$	Reverse Transfer Capacitance	$f = 1MHz$		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	<b>Inductive Switching @ 125°C</b> $V_{GS} = 15V$ $V_{Bus} = 400V$ $I_D = 72A$ $R_G = 2.5\Omega$		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 ❶	<b>Inductive switching @ 25°C</b> $V_{GS} = 15V, V_{Bus} = 400V$ $I_D = 72A, R_G = 2.5\Omega$		1340		$\mu J$
$E_{off}$	Turn-off Switching Energy ❷			1960		
$E_{on}$	Turn-on Switching Energy ❶	<b>Inductive switching @ 125°C</b> $V_{GS} = 15V, V_{Bus} = 400V$ $I_D = 72A, R_G = 2.5\Omega$		2192		$\mu J$
$E_{off}$	Turn-off Switching Energy ❷			2412		

## Diode ratings and characteristics

Symbol	Characteristic	Test Conditions	Min	Typ	Max	Unit
$V_{RRM}$	Maximum Peak Repetitive Reverse Voltage		600			V
$I_{RM}$	Maximum Reverse Leakage Current	$V_R = 600V$	$T_j = 25^\circ\text{C}$		250	$\mu A$
			$T_j = 125^\circ\text{C}$		750	
$I_{F(AV)}$	Maximum Average Forward Current	50% duty cycle $T_c = 70^\circ\text{C}$		60		A
$V_F$	Diode Forward Voltage	$I_F = 60A$		2.2	2.7	V
		$I_F = 120A$		2.3		
		$I_F = 60A, T_j = 125^\circ\text{C}$		1.4		
$t_{rr}$	Reverse Recovery Time	$I_F = 60A$ $V_R = 400V$ $di/dt = 200A/\mu s$	$T_j = 25^\circ\text{C}$	55		ns
			$T_j = 125^\circ\text{C}$	151		
$Q_{rr}$	Reverse Recovery Charge	$I_F = 60A$ $V_R = 400V$ $di/dt = 200A/\mu s$	$T_j = 25^\circ\text{C}$	121		nC
			$T_j = 125^\circ\text{C}$	999		

❶  $E_{on}$  includes diode reverse recovery.

❷ In accordance with JEDEC standard JESD24-1.

**Thermal and package characteristics**

Symbol	Characteristic	Min	Typ	Max	Unit
R <sub>thJC</sub>	Junction to Case	IGBT		0.3	°C/W
		Diode		0.9	
V <sub>ISOL</sub>	RMS Isolation Voltage, any terminal to case t=1 min, I <sub>isol</sub> <1mA, 50/60Hz	2500			V
T <sub>J</sub>	Operating junction temperature range	-40		150	°C
T <sub>STG</sub>	Storage Temperature Range	-40		125	
T <sub>C</sub>	Operating Case Temperature	-40		100	
Torque	Mounting torque	To heatsink	M4	4.7	N.m
Wt	Package Weight			110	g

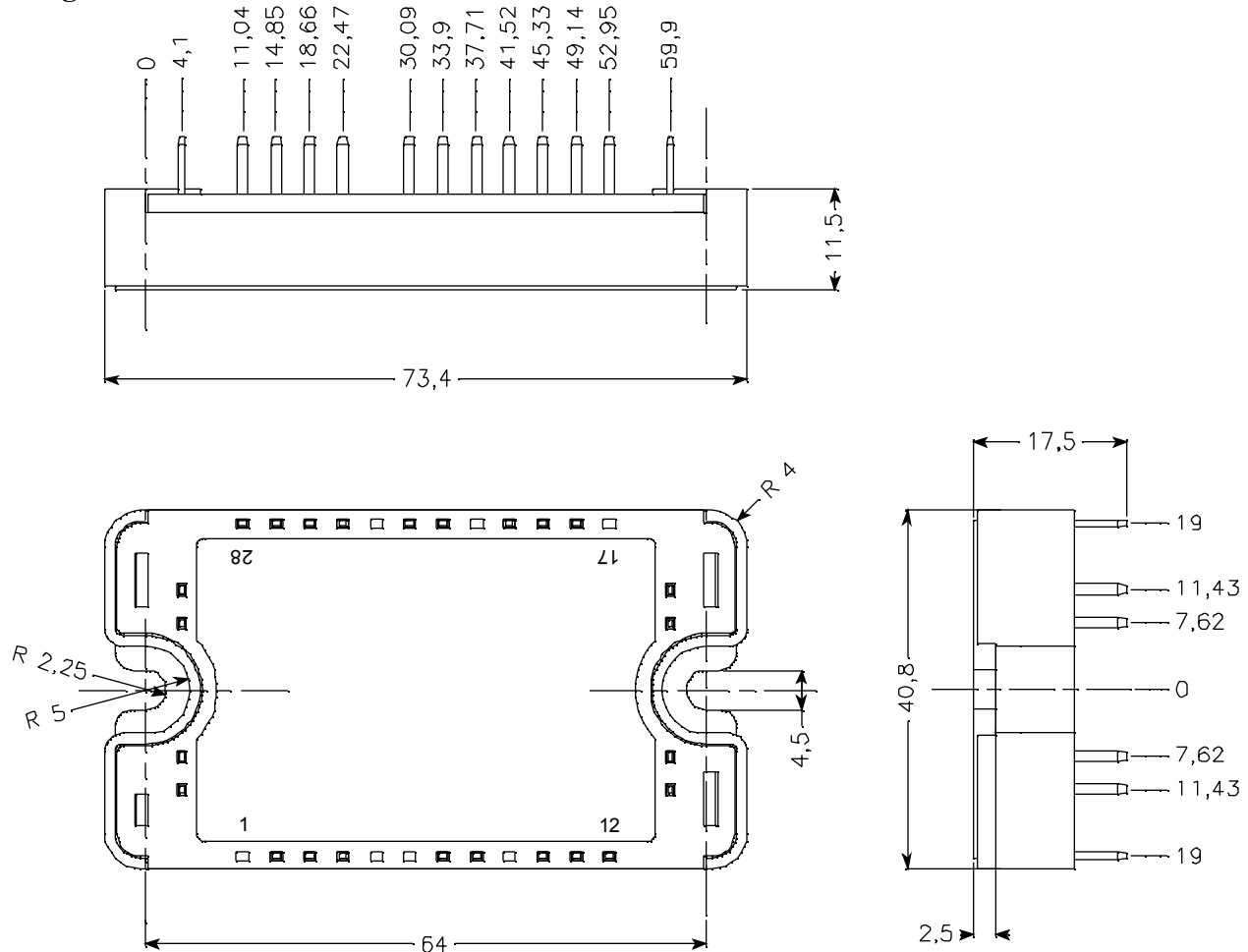
**Temperature sensor NTC**

Symbol	Characteristic	Min	Typ	Max	Unit
R <sub>25</sub>	Resistance @ 25°C		68		kΩ
B <sub>25/85</sub>	T <sub>25</sub> = 298.16 K		4080		K

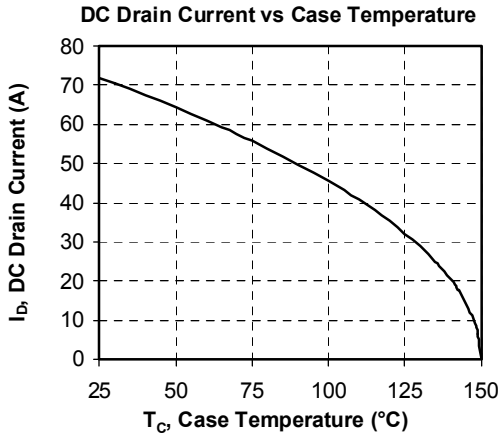
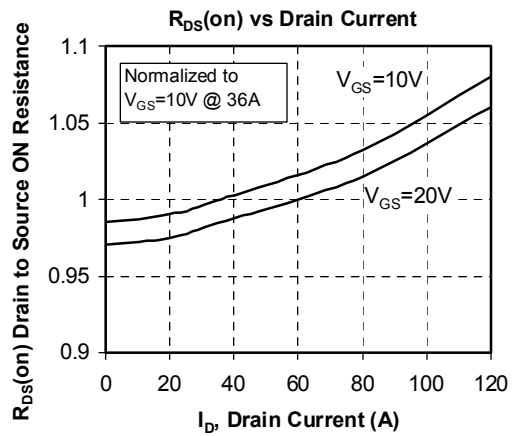
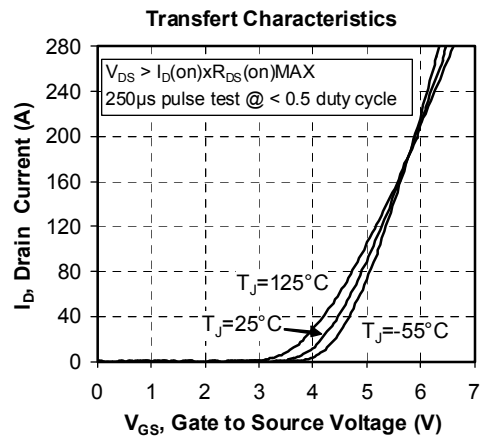
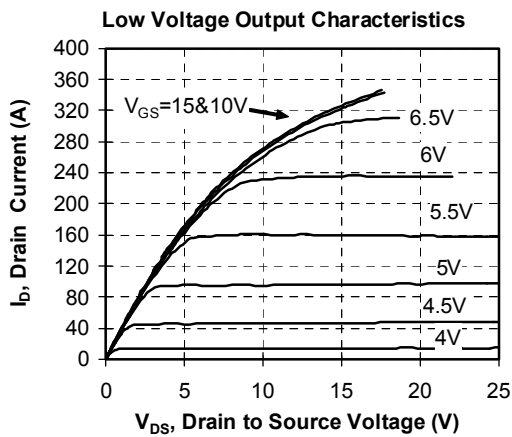
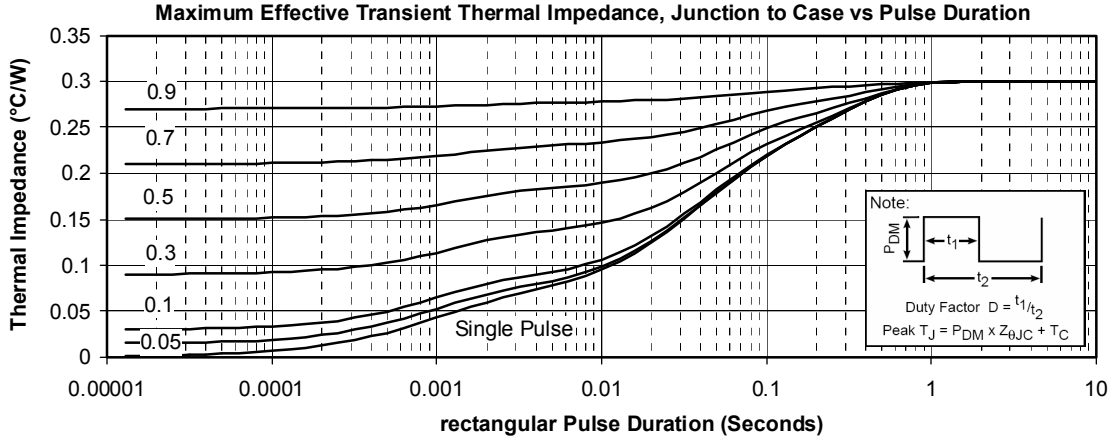
$$R_T = \frac{R_{25}}{\exp \left[ B_{25/85} \left( \frac{1}{T_{25}} - \frac{1}{T} \right) \right]}$$

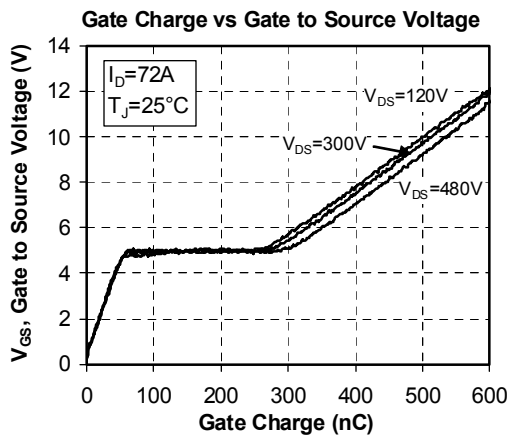
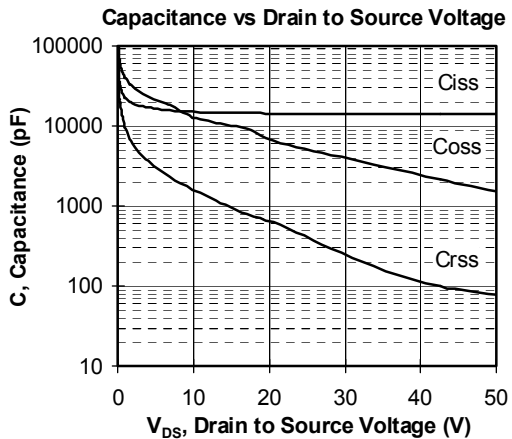
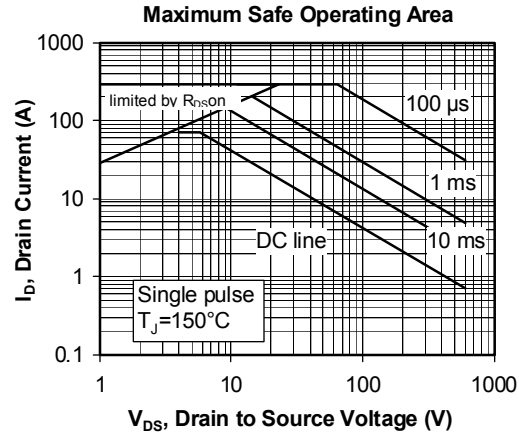
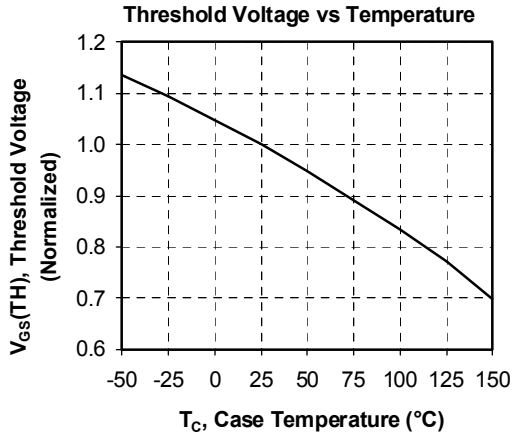
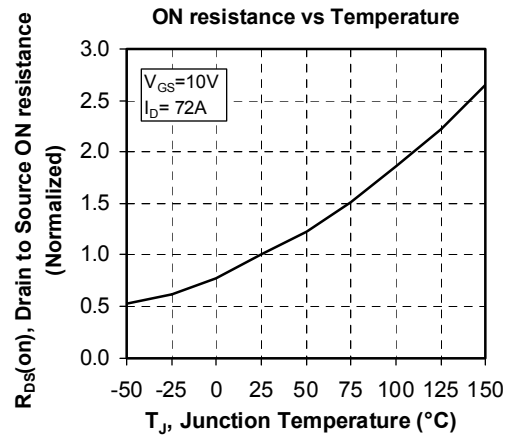
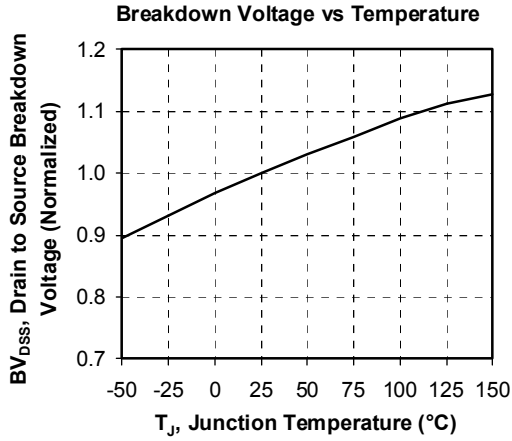
T: Thermistor temperature  
R<sub>T</sub>: Thermistor value at T

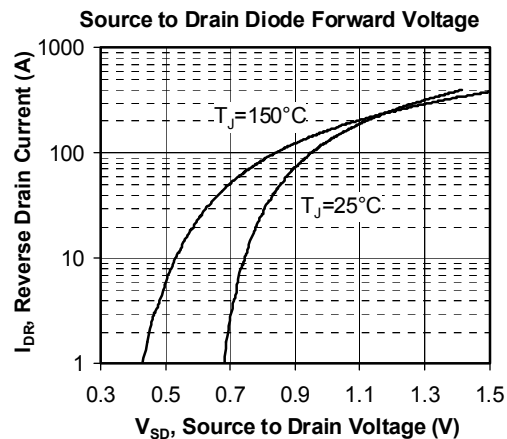
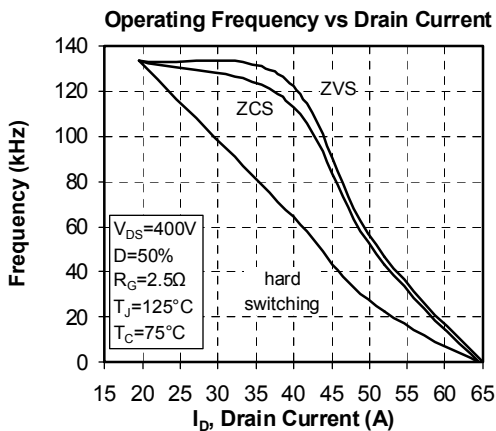
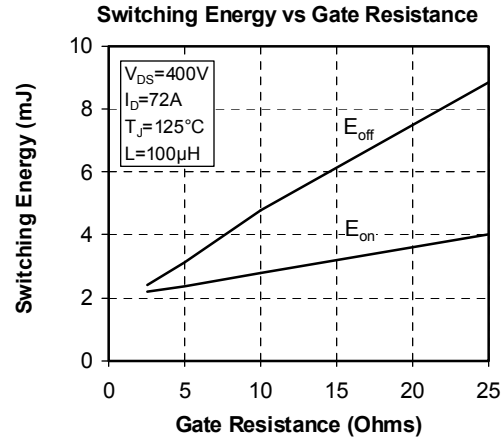
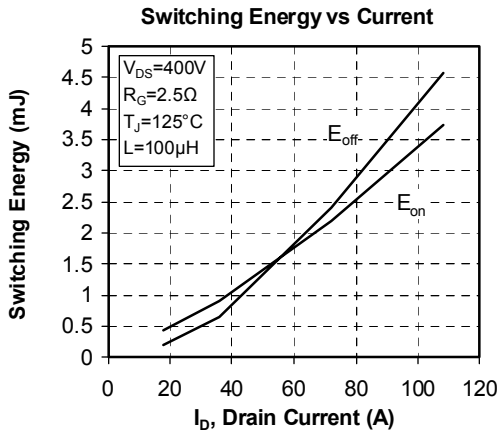
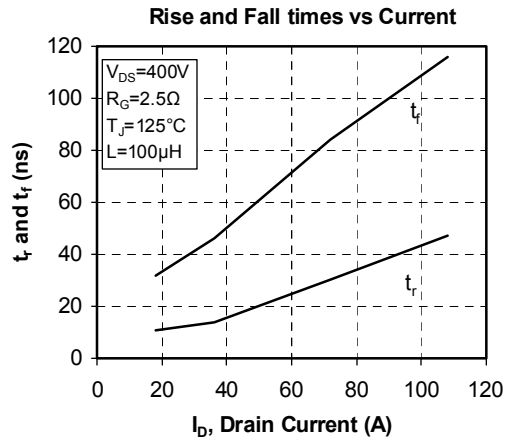
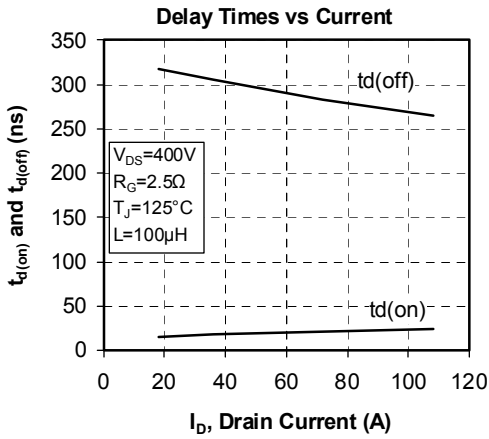
**Package outline**



**Typical Performance Curve**







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