

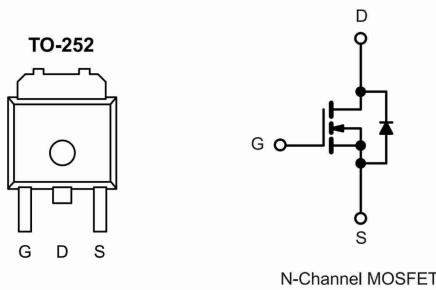
# IPD50N06S4L12ATMA2-VB Datasheet

Single-N 60V Trench TO252 MOSFET

PRODUCT SUMMARY		
$V_{DS}$ (V)	$R_{DS(on)}$ ( $\Omega$ )	$I_D$ (A) <sup>a</sup>
60	0.010 at $V_{GS} = 10$ V	58
	0.013 at $V_{GS} = 4.5$ V	56

## FEATURES

- 175 °C Junction Temperature
- TrenchFET® Power MOSFET
- Material categorization:



N-Channel MOSFET

ABSOLUTE MAXIMUM RATINGS ( $T_C = 25$ °C, unless otherwise noted)				
Parameter	Symbol	Limit	Unit	
Gate-Source Voltage	$V_{GS}$	$\pm 20$	V	
Continuous Drain Current ( $T_J = 175$ °C) <sup>b</sup>	$I_D$ ( $T_C = 25$ °C)	58	A	
	$I_D$ ( $T_C = 100$ °C)	48 <sup>a</sup>		
Pulsed Drain Current	$I_{DM}$	100	A	
Continuous Source Current (Diode Conduction)	$I_S$	50 <sup>a</sup>		
Avalanche Current	$I_{AS}$	50		
Single Avalanche Energy (Duty Cycle $\leq 1$ %)	$E_{AS}$	125	mJ	
Maximum Power Dissipation	$P_D$ ( $T_C = 25$ °C)	136	W	
	$P_D$ ( $T_A = 25$ °C)	3 <sup>b</sup> , 8.3 <sup>b, c</sup>		
Operating Junction and Storage Temperature Range	$T_J, T_{stg}$	-55 to 175	°C	

THERMAL RESISTANCE RATINGS					
Parameter	Symbol	Typical	Maximum	Unit	
Maximum Junction-to-Ambient <sup>a</sup>	$R_{thJA}$ ( $t \leq 10$ sec)	15	18	°C/W	
	$R_{thJA}$ (Steady State)	40	50		
Maximum Junction-to-Case	$R_{thJC}$	0.85	1.1		

Notes:

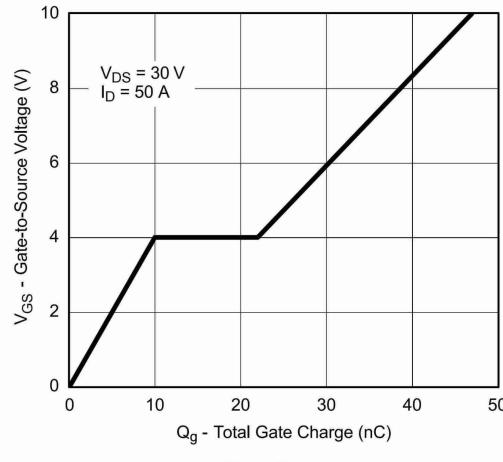
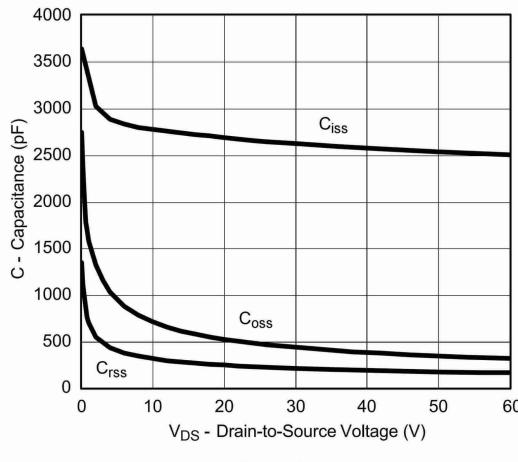
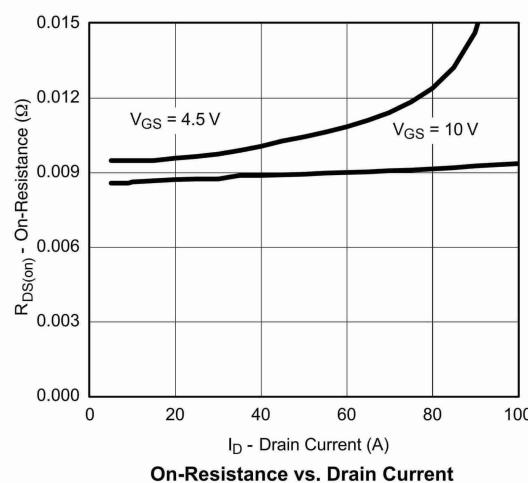
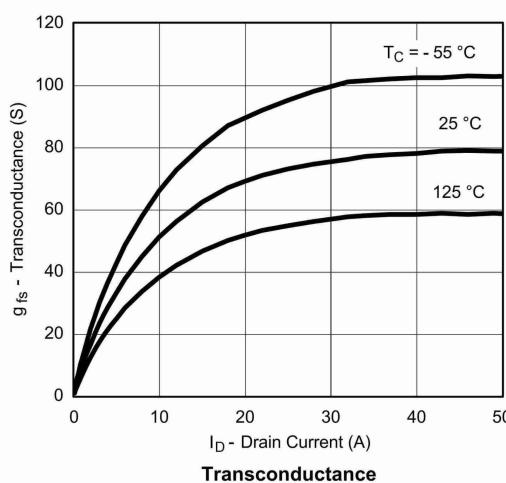
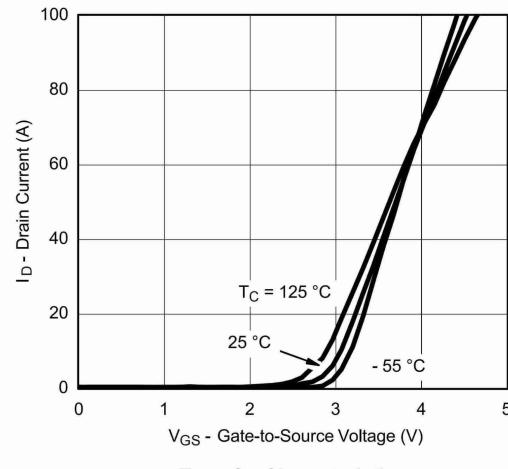
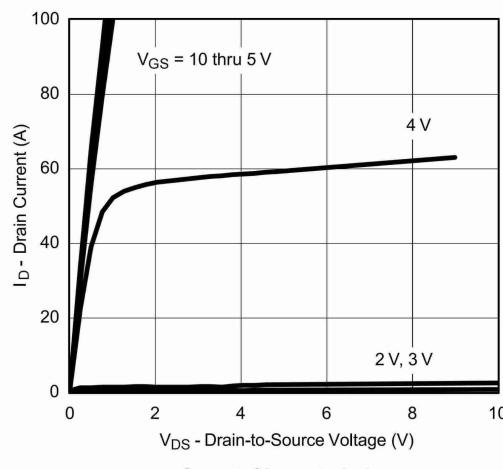
- a. Package limited.
- b. Surface mounted on 1" x 1" FR4 board.
- c.  $t \leq 10$  s.

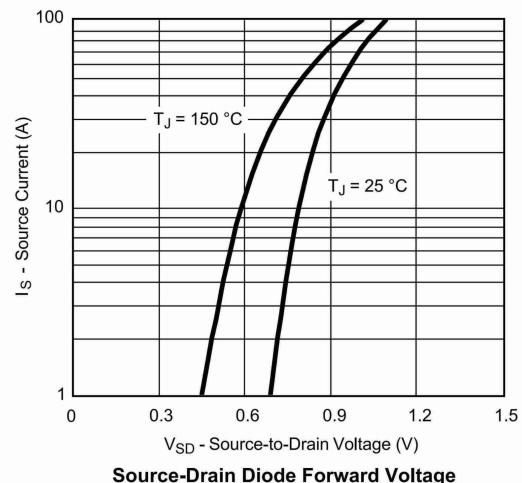
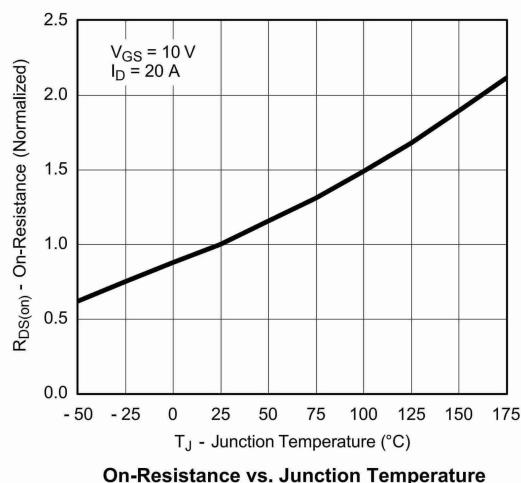
<b>SPECIFICATIONS</b> ( $T_J = 25^\circ\text{C}$ , unless otherwise noted)						
Parameter	Symbol	Test Conditions	Min.	Typ. <sup>a</sup>	Max.	Unit
<b>Static</b>						
Drain-Source Breakdown Voltage	$V_{DS}$	$V_{GS} = 0 \text{ V}$ , $I_D = 250 \mu\text{A}$	60			V
Gate Threshold Voltage	$V_{GS(\text{th})}$	$V_{DS} = V_{GS}$ , $I_D = 250 \mu\text{A}$	1	2	3	
Gate-Body Leakage	$I_{GSS}$	$V_{DS} = 0 \text{ V}$ , $V_{GS} = \pm 20 \text{ V}$			$\pm 100$	nA
Zero Gate Voltage Drain Current	$I_{DSS}$	$V_{DS} = 60 \text{ V}$ , $V_{GS} = 0 \text{ V}$		1		
		$V_{DS} = 60 \text{ V}$ , $V_{GS} = 0 \text{ V}$ , $T_J = 125^\circ\text{C}$		50		$\mu\text{A}$
		$V_{DS} = 60 \text{ V}$ , $V_{GS} = 0 \text{ V}$ , $T_J = 175^\circ\text{C}$		250		
On-State Drain Current <sup>b</sup>	$I_{D(\text{on})}$	$V_{DS} = 5 \text{ V}$ , $V_{GS} = 10 \text{ V}$	60			A
Drain-Source On-State Resistance <sup>b</sup>	$R_{DS(\text{on})}$	$V_{GS} = 10 \text{ V}$ , $I_D = 20 \text{ A}$		0.010		
		$V_{GS} = 10 \text{ V}$ , $I_D = 20 \text{ A}$ , $T_J = 125^\circ\text{C}$		0.016		$\Omega$
		$V_{GS} = 10 \text{ V}$ , $I_D = 20 \text{ A}$ , $T_J = 175^\circ\text{C}$		0.020		
		$V_{GS} = 4.5 \text{ V}$ , $I_D = 15 \text{ A}$		0.013		
Forward Transconductance <sup>b</sup>	$g_{fs}$	$V_{DS} = 15 \text{ V}$ , $I_D = 20 \text{ A}$		60		S
<b>Dynamic</b>						
Input Capacitance	$C_{iss}$	$V_{GS} = 0 \text{ V}$ , $V_{DS} = 25 \text{ V}$ , $f = 1 \text{ MHz}$		2650		
Output Capacitance	$C_{oss}$			470		$\text{pF}$
Reverse Transfer Capacitance	$C_{rss}$			225		
Total Gate Charge <sup>c</sup>	$Q_g$	$V_{DS} = 30 \text{ V}$ , $V_{GS} = 10 \text{ V}$ , $I_D = 50 \text{ A}$		47	70	
Gate-Source Charge <sup>c</sup>	$Q_{gs}$			10		$\text{nC}$
Gate-Drain Charge <sup>c</sup>	$Q_{gd}$			12		
Turn-On Delay Time <sup>c</sup>	$t_{d(\text{on})}$	$V_{DD} = 30 \text{ V}$ , $R_L = 0.6 \Omega$ $I_D \geq 50 \text{ A}$ , $V_{GEN} = 10 \text{ V}$ , $R_g = 2.5 \Omega$		10	20	
Rise Time <sup>c</sup>	$t_r$			15	25	
Turn-Off Delay Time <sup>c</sup>	$t_{d(\text{off})}$			35	50	
Fall Time <sup>c</sup>	$t_f$			20	30	ns
<b>Source-Drain Diode Ratings and Characteristics</b> ( $T_C = 25^\circ\text{C}$ )						
Pulsed Current	$I_{SM}$				60	A
Diode Forward Voltage	$V_{SD}$	$I_F = 20 \text{ A}$ , $V_{GS} = 0 \text{ V}$		1	1.5	V
Reverse Recovery Time	$t_{rr}$	$I_F = 20 \text{ A}$ , $\text{di}/\text{dt} = 100 \text{ A}/\mu\text{s}$		45	100	ns

## Notes:

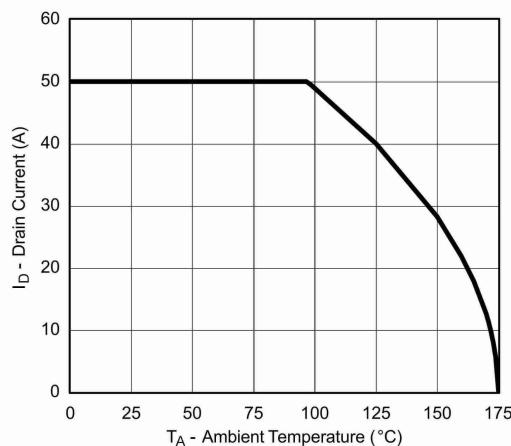
a. For design aid only; not subject to production testing.  
 b. Pulse test; pulse width  $\leq 300 \mu\text{s}$ , duty cycle  $\leq 2\%$ .  
 c. Independent of operating temperature.

Stresses beyond those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated in the operational sections of the specifications is not implied. Exposure to absolute maximum rating conditions for extended periods may affect device reliability.

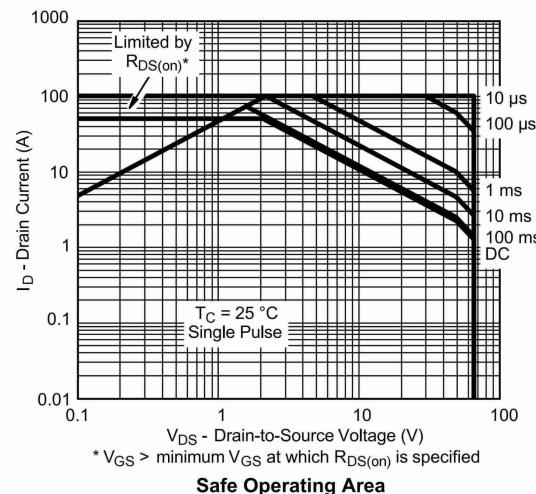
**TYPICAL CHARACTERISTICS** (25 °C unless noted)


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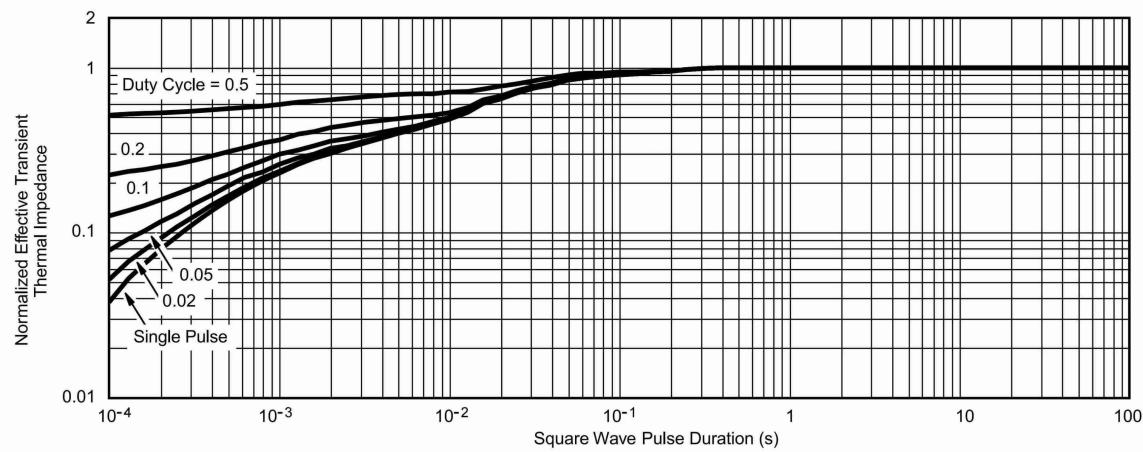
## THERMAL RATINGS



Maximum Drain Current vs. Ambient Temperature

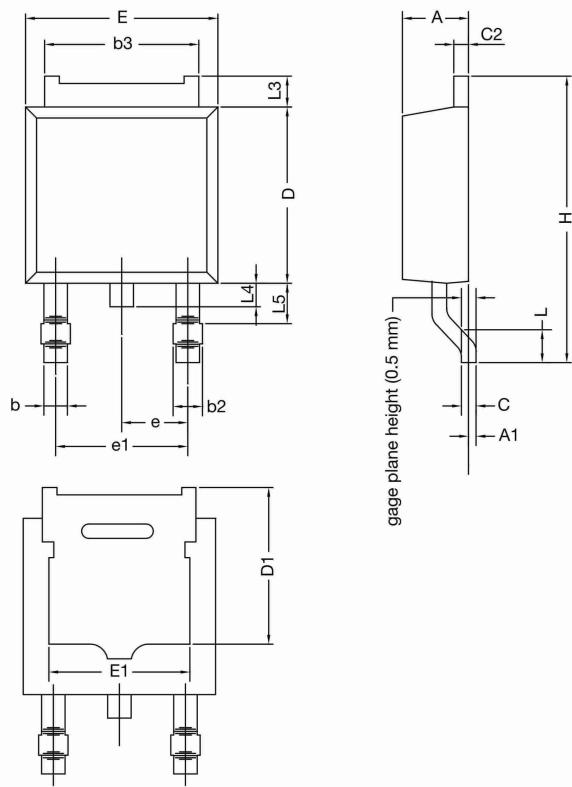


Safe Operating Area



Normalized Thermal Transient Impedance, Junction-to-Case

## TO-252AA CASE OUTLINE



DIM.	MILLIMETERS		INCHES	
	MIN.	MAX.	MIN.	MAX.
A	2.18	2.38	0.086	0.094
A1	-	0.127	-	0.005
b	0.64	0.88	0.025	0.035
b2	0.76	1.14	0.030	0.045
b3	4.95	5.46	0.195	0.215
C	0.46	0.61	0.018	0.024
C2	0.46	0.89	0.018	0.035
D	5.97	6.22	0.235	0.245
D1	5.21	-	0.205	-
E	6.35	6.73	0.250	0.265
E1	4.32	-	0.170	-
H	9.40	10.41	0.370	0.410
e	2.28 BSC		0.090 BSC	
e1	4.56 BSC		0.180 BSC	
L	1.40	1.78	0.055	0.070
L3	0.89	1.27	0.035	0.050
L4	-	1.02	-	0.040
L5	1.14	1.52	0.045	0.060

ECN: X12-0247-Rev. M, 24-Dec-12  
 DWG: 5347

### Note

- Dimension L3 is for reference only.

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