

# CPH6445-TL-E-VB Datasheet

## N-Channel 60 V (D-S) MOSFET

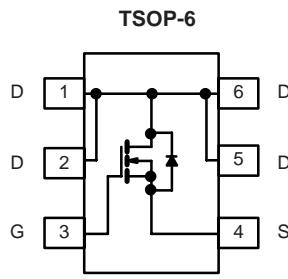
PRODUCT SUMMARY	
$V_{DS}$ (V)	60
$R_{DS(on)}$ ( $\Omega$ ) at $V_{GS} = 10$ V	0.030
$R_{DS(on)}$ ( $\Omega$ ) at $V_{GS} = 4.5$ V	0.035
$I_D$ (A)	7
Configuration	Single

### FEATURES

- Trench power MOSFET
- 100 %  $R_g$  and UIS tested



**RoHS**  
COMPLIANT  
**HALOGEN**  
**FREE**



Top View

ABSOLUTE MAXIMUM RATINGS ( $T_C = 25$ °C, unless otherwise noted)			
PARAMETER	SYMBOL	LIMIT	UNIT
Drain-Source Voltage	$V_{DS}$	60	V
Gate-Source Voltage	$V_{GS}$	$\pm 20$	
Continuous Drain Current	$I_D$	7	A
		4	
Continuous Source Current (Diode Conduction)	$I_S$	6	
Pulsed Drain Current <sup>a</sup>	$I_{DM}$	29	
Single Pulse Avalanche Current	$I_{AS}$	10	mJ
Single Pulse Avalanche Energy	$E_{AS}$	5	
Maximum Power Dissipation <sup>a</sup>	$P_D$	5	W
		1.6	
Operating Junction and Storage Temperature Range	$T_J, T_{stg}$	- 55 to +175	°C

THERMAL RESISTANCE RATINGS			
PARAMETER	SYMBOL	LIMIT	UNIT
Junction-to-Ambient	$R_{thJA}$	110	°C/W
Junction-to-Foot (Drain)		30	

### Notes

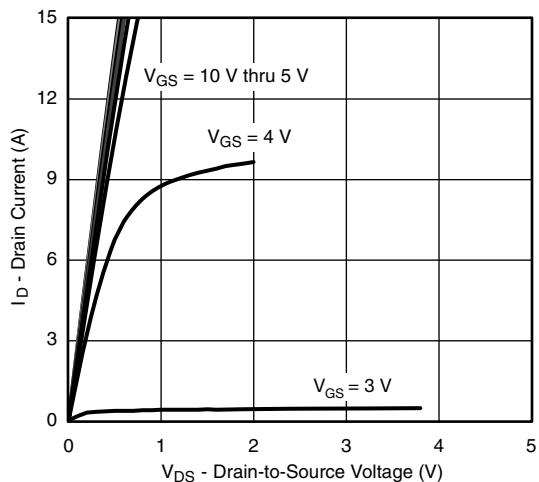
- Pulse test; pulse width  $\leq 300$   $\mu$ s, duty cycle  $\leq 2$  %.
- When mounted on 1" square PCB (FR-4 material).

SPECIFICATIONS ( $T_C = 25^\circ\text{C}$ , unless otherwise noted)								
PARAMETER	SYMBOL	TEST CONDITIONS		MIN.	TYP.	MAX.	UNIT	
<b>Static</b>								
Drain-Source Breakdown Voltage	$V_{DS}$	$V_{GS} = 0$ , $I_D = 250 \mu\text{A}$		60	-	-	V	
Gate-Source Threshold Voltage	$V_{GS(\text{th})}$	$V_{DS} = V_{GS}$ , $I_D = 250 \mu\text{A}$		1.0	-	2.5		
Gate-Source Leakage	$I_{GSS}$	$V_{DS} = 0 \text{ V}$ , $V_{GS} = \pm 12 \text{ V}$		-	-	$\pm 500$	nA	
		$V_{DS} = 0 \text{ V}$ , $V_{GS} = \pm 20 \text{ V}$		-	-	$\pm 1$	mA	
Zero Gate Voltage Drain Current	$I_{DSS}$	$V_{GS} = 0 \text{ V}$	$V_{DS} = 60 \text{ V}$	-	-	1	$\mu\text{A}$	
		$V_{GS} = 0 \text{ V}$	$V_{DS} = 60 \text{ V}$ , $T_J = 125^\circ\text{C}$	-	-	50		
		$V_{GS} = 0 \text{ V}$	$V_{DS} = 60 \text{ V}$ , $T_J = 175^\circ\text{C}$	-	-	150		
On-State Drain Current <sup>a</sup>	$I_{D(\text{on})}$	$V_{GS} = 10 \text{ V}$	$V_{DS} \geq 5 \text{ V}$	10	-	-	A	
Drain-Source On-State Resistance <sup>a</sup>	$R_{DS(\text{on})}$	$V_{GS} = 10 \text{ V}$	$I_D = 5 \text{ A}$	-	0.030	-	$\Omega$	
		$V_{GS} = 10 \text{ V}$	$I_D = 5 \text{ A}$ , $T_J = 125^\circ\text{C}$	-	0.050	-		
		$V_{GS} = 10 \text{ V}$	$I_D = 5 \text{ A}$ , $T_J = 175^\circ\text{C}$	-	0.070	-		
		$V_{GS} = 4.5 \text{ V}$	$I_D = 4 \text{ A}$	-	0.035	-		
Forward Transconductance <sup>a</sup>	$g_{fs}$	$V_{DS} = 15 \text{ V}$ , $I_D = 4 \text{ A}$		-	12	-	S	
<b>Dynamic <sup>b</sup></b>								
Input Capacitance	$C_{iss}$	$V_{GS} = 0 \text{ V}$	$V_{DS} = 30 \text{ V}$ , $f = 1 \text{ MHz}$	-	560	700	pF	
Output Capacitance	$C_{oss}$			-	85	105		
Reverse Transfer Capacitance	$C_{rss}$			-	55	70		
Total Gate Charge <sup>c</sup>	$Q_g$	$V_{GS} = 4.5 \text{ V}$	$V_{DS} = 30 \text{ V}$ , $I_D = 4 \text{ A}$	-	7.6	12	nC	
Gate-Source Charge <sup>c</sup>	$Q_{gs}$			-	2.1	-		
Gate-Drain Charge <sup>c</sup>	$Q_{gd}$			-	4.1	-		
Gate Resistance	$R_g$	$f = 1 \text{ MHz}$		1.2	2.4	3.6	$\Omega$	
Turn-On Delay Time <sup>c</sup>	$t_{d(\text{on})}$	$V_{DD} = 30 \text{ V}$ , $R_L = 7.5 \Omega$ $I_D \geq 4 \text{ A}$ , $V_{GEN} = 10 \text{ V}$ , $R_g = 1 \Omega$		-	9	14	ns	
Rise Time <sup>c</sup>	$t_r$			-	12	18		
Turn-Off Delay Time <sup>c</sup>	$t_{d(\text{off})}$			-	19	29		
Fall Time <sup>c</sup>	$t_f$			-	7	11		
Source-Drain Diode Ratings and Characteristics <sup>b</sup>								
Pulsed Current <sup>a</sup>	$I_{SM}$			-	-	29	A	
Forward Voltage	$V_{SD}$	$I_F = 1.6 \text{ A}$ , $V_{GS} = 0$		-	0.75	1.2	V	

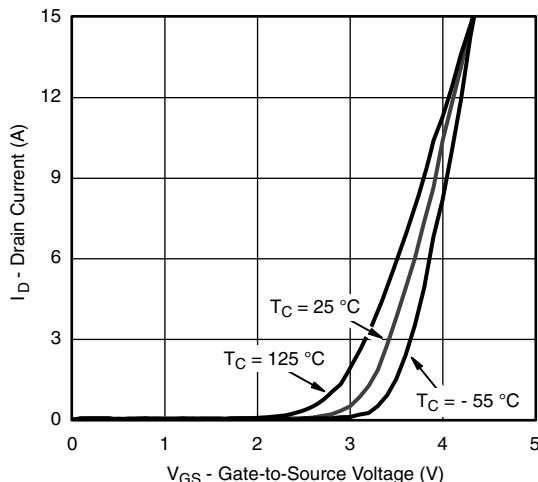
**Notes**

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

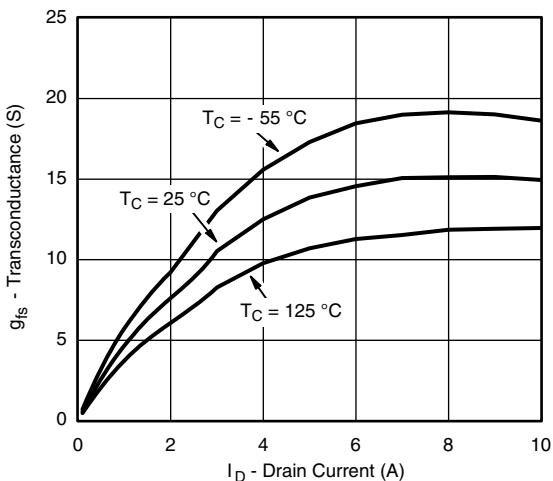
Stresses beyond those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated in the operational sections of the specifications is not implied. Exposure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

**TYPICAL CHARACTERISTICS** ( $T_A = 25^\circ\text{C}$ , unless otherwise noted)


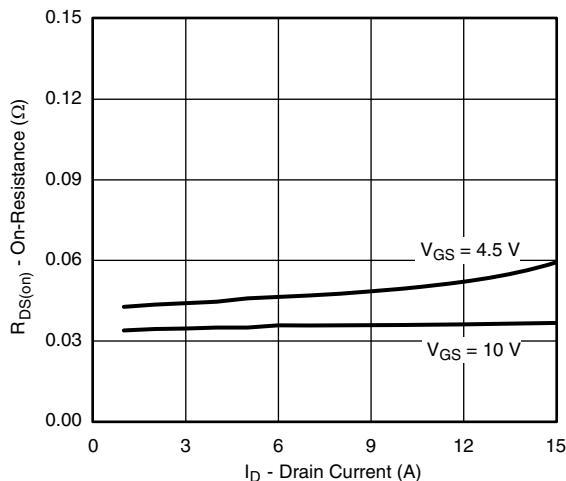
Output Characteristics



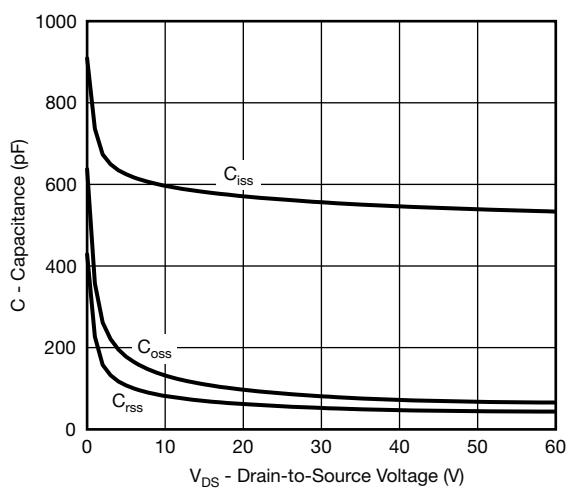
Transfer Characteristics



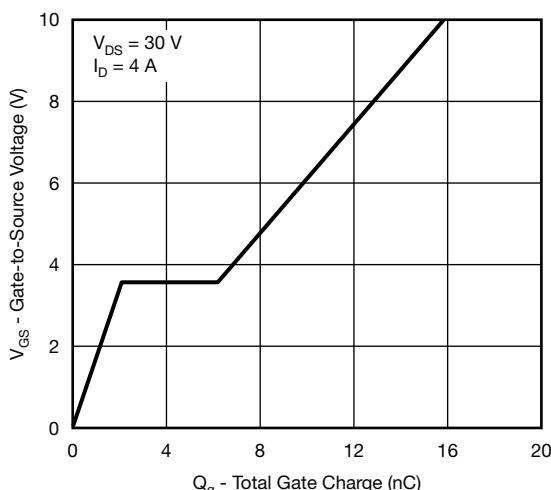
Transconductance



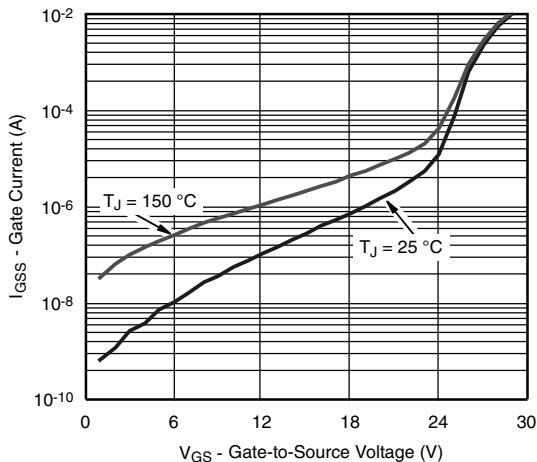
On-Resistance vs. Drain Current



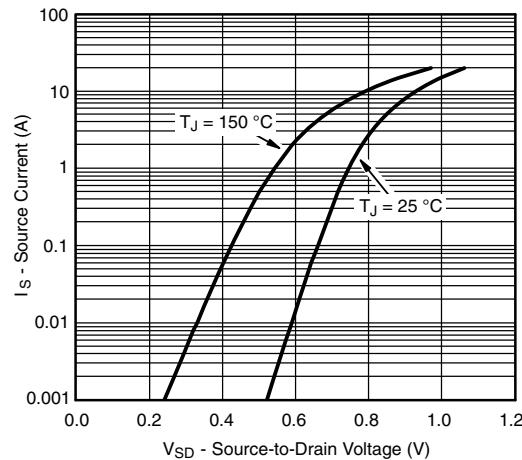
Capacitance



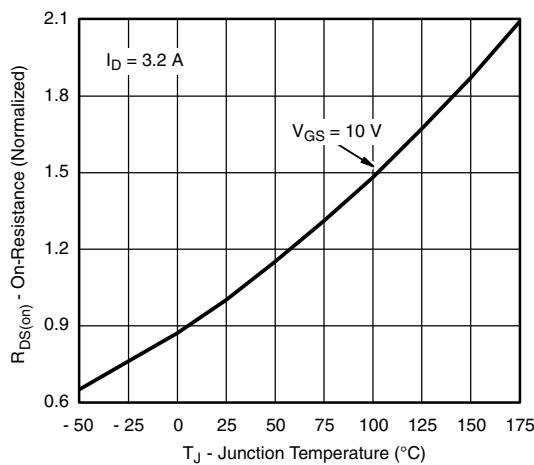
Gate Charge

**TYPICAL CHARACTERISTICS** ( $T_A = 25^\circ\text{C}$ , unless otherwise noted)


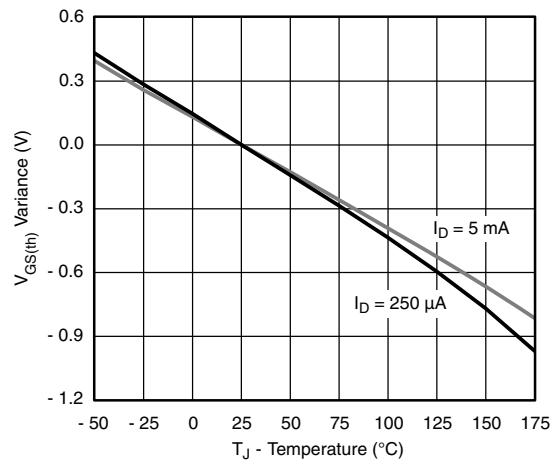
Gate Current vs. Gate-Source Voltage



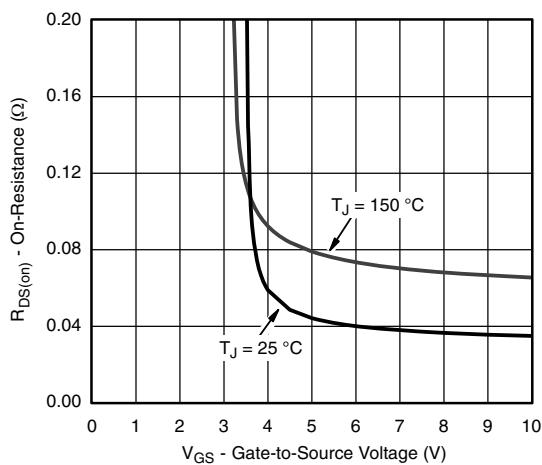
Source-Drain Diode Forward Voltage



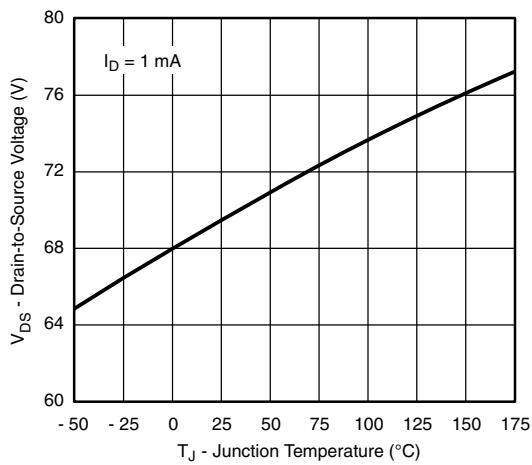
On-Resistance vs. Junction Temperature



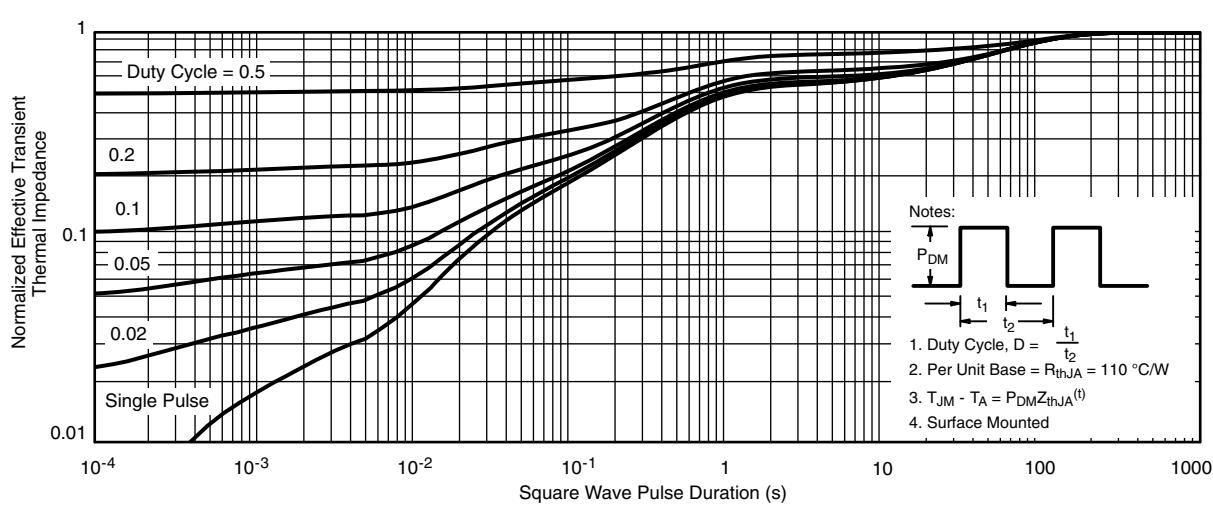
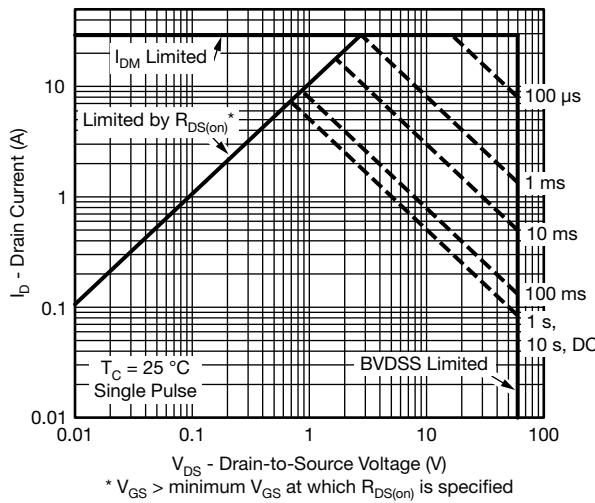
Threshold Voltage

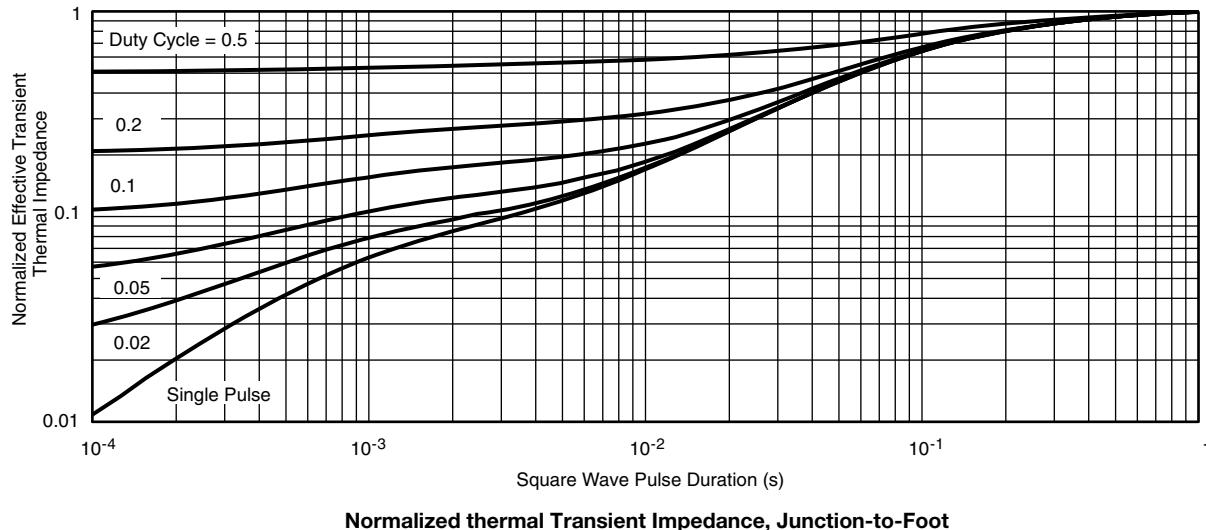


On-Resistance vs. Gate-Source Voltage



Drain-Source Breakdown vs. Junction Temperature

**THERMAL RATINGS** ( $T_A = 25^\circ\text{C}$ , unless otherwise noted)


**THERMAL RATINGS** ( $T_A = 25^\circ\text{C}$ , unless otherwise noted)

**Note**

- The characteristics shown in the two graphs
  - Normalized Transient Thermal Impedance Junction to Ambient ( $25^\circ\text{C}$ )
  - Normalized Transient Thermal Impedance Junction to Foot ( $25^\circ\text{C}$ )

are given for general guidelines only to enable the user to get a "ball park" indication of part capabilities. The data are extracted from single pulse transient thermal impedance characteristics which are developed from empirical measurements. The latter is valid for the part mounted on printed circuit board - FR4, size 1" x 1" x 0.062", double sided with 2 oz. copper, 100 % on both sides. The part capabilities can widely vary depending on actual application parameters and operating conditions.

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