



# N-Channel Reduced $Q_g$ , Fast Switching MOSFET

## PRODUCT SUMMARY

$V_{DS}$ (V)	$r_{DS(on)}$ ( $\Omega$ )	$I_D$ (A)
30	0.0095 @ $V_{GS} = 10$ V	16
	0.0125 @ $V_{GS} = 4.5$ V	16

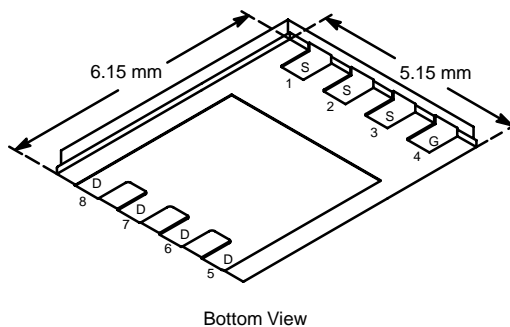
## FEATURES

- TrenchFET® Power MOSFET
- PWM Optimized for High Efficiency
- New Low Thermal Resistance PowerPAK® Package with Low 1.07-mm Profile
- 100%  $R_g$  Tested

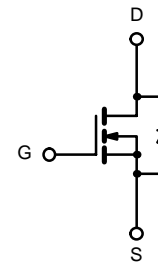
## APPLICATIONS

- Buck Converter
  - High Side or Low Side
- Synchronous Rectifier
  - Secondary Rectifier

PowerPAK SO-8



Ordering Information: Si7860ADP-T1-E3



N-Channel MOSFET

## ABSOLUTE MAXIMUM RATINGS ( $T_A = 25^\circ\text{C}$ UNLESS OTHERWISE NOTED)

Parameter		Symbol	10 secs	Steady State	Unit
Drain-Source Voltage		V <sub>DS</sub>	30		V
Gate-Source Voltage		V <sub>GS</sub>	±20		
Continuous Drain Current (T <sub>J</sub> = 150°C) <sup>a</sup>	T <sub>A</sub> = 25°C	I <sub>D</sub>	16	11	A
	T <sub>A</sub> = 70°C		13	8	
Pulsed Drain Current		I <sub>DM</sub>	±50		
Continuous Source Current (Diode Conduction) <sup>a</sup>		I <sub>S</sub>	4.1	1.5	
Maximum Power Dissipation <sup>a</sup>	T <sub>A</sub> = 25°C	P <sub>D</sub>	4.8	1.8	W
	T <sub>A</sub> = 70°C		3.1	1.1	
Operating Junction and Storage Temperature Range		T <sub>J</sub> , T <sub>stg</sub>	-55 to 150		°C

## THERMAL RESISTANCE RATINGS

Parameter		Symbol	Typical	Maximum	Unit
Maximum Junction-to-Ambient (MOSFET) <sup>a</sup>	$t \leq 10$ sec	$R_{thJA}$	21	26	$^\circ\text{C/W}$
	Steady State		56	70	
Maximum Junction-to-Case (Drain)	Steady State	$R_{thJC}$	1.9	2.5	

Notes

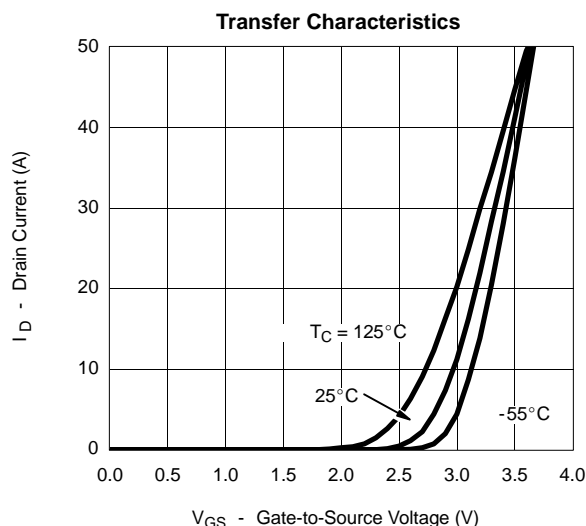
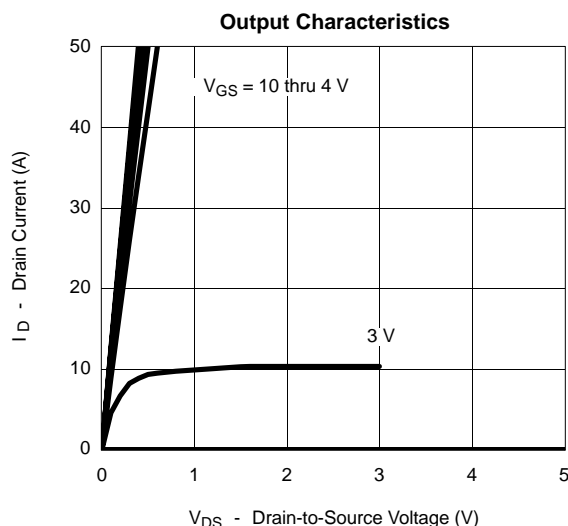
a. Surface Mounted on 1" x 1" FR4 Board.

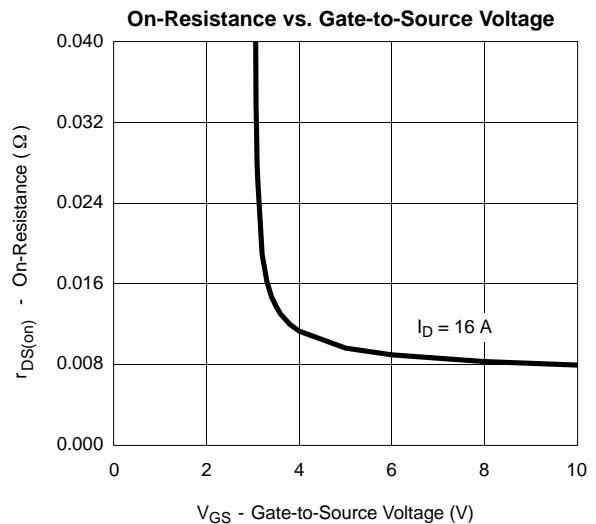
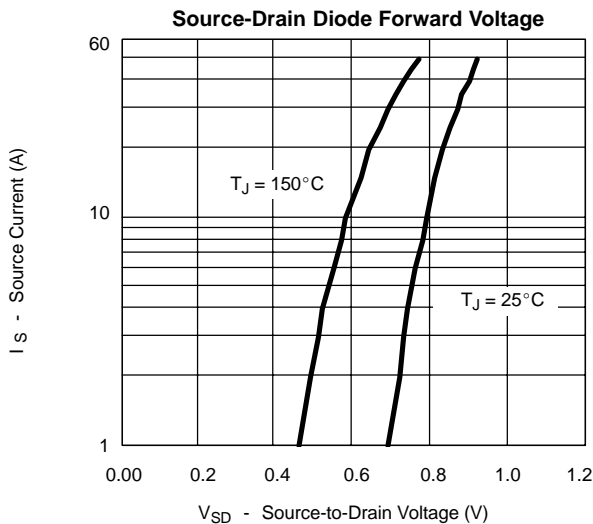
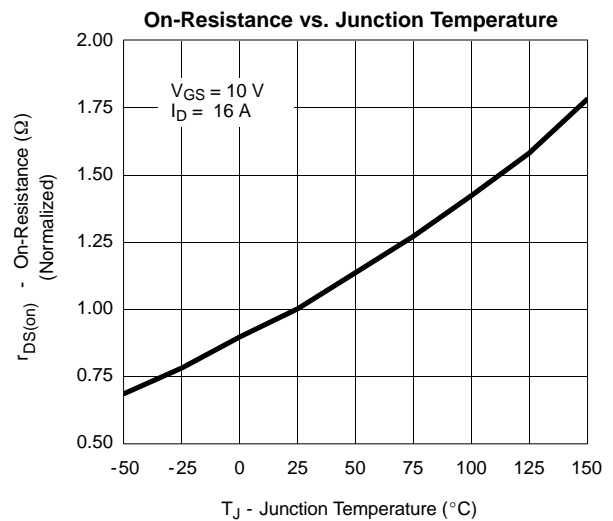
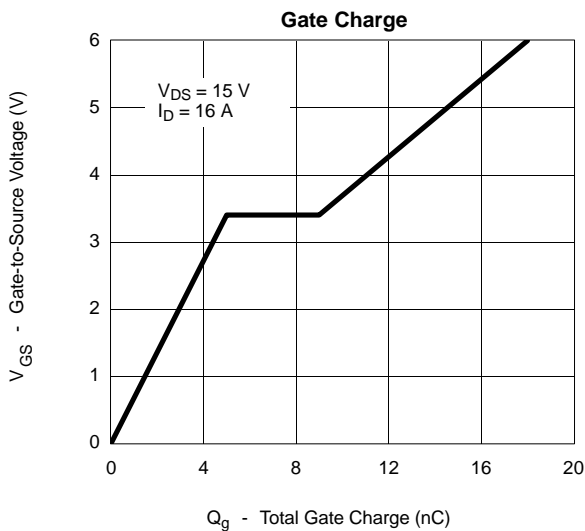
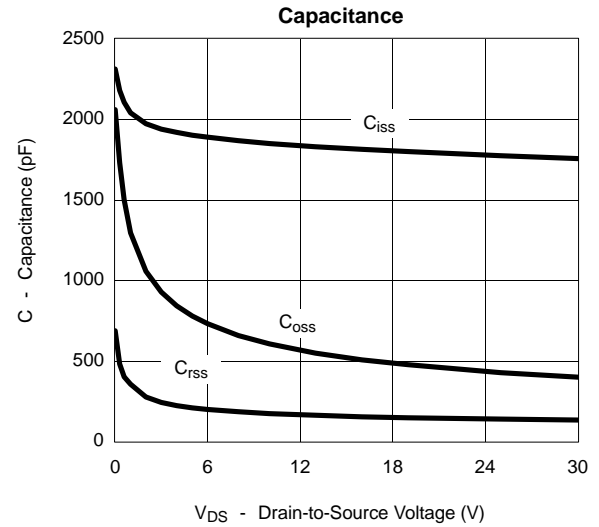
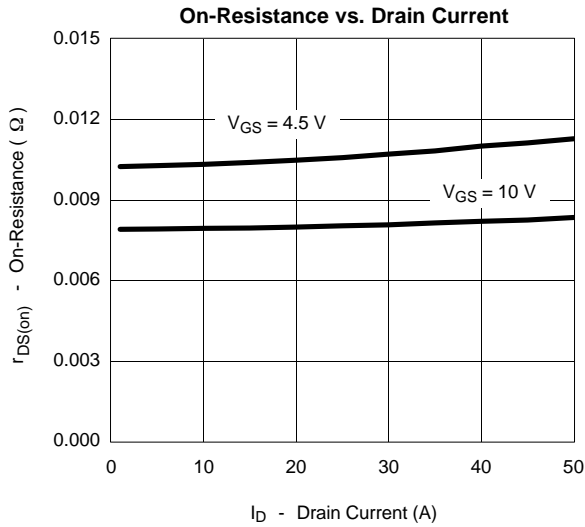
**MOSFET SPECIFICATIONS ( $T_J = 25^\circ\text{C}$  UNLESS OTHERWISE NOTED)**

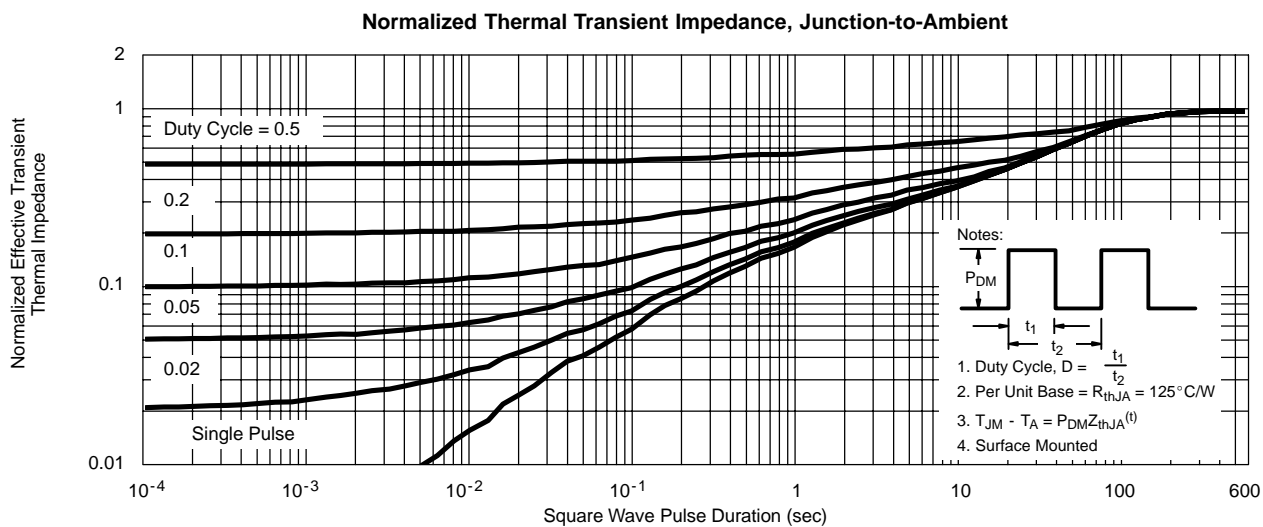
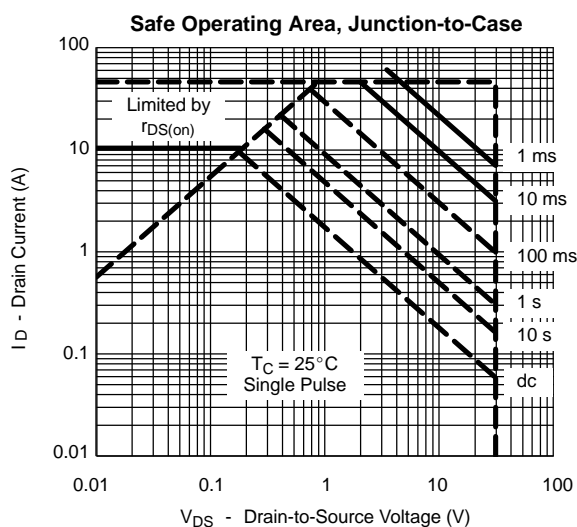
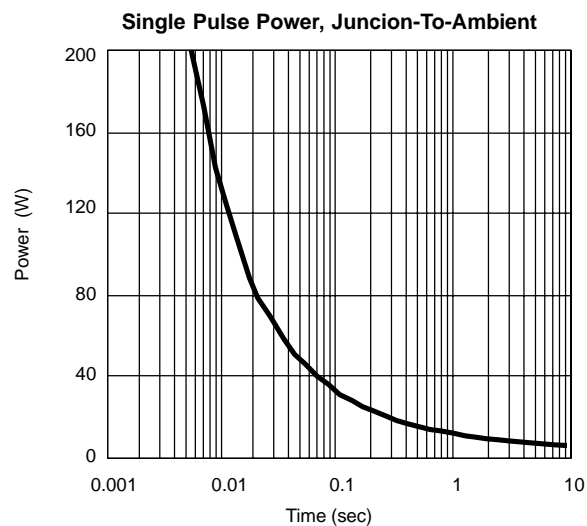
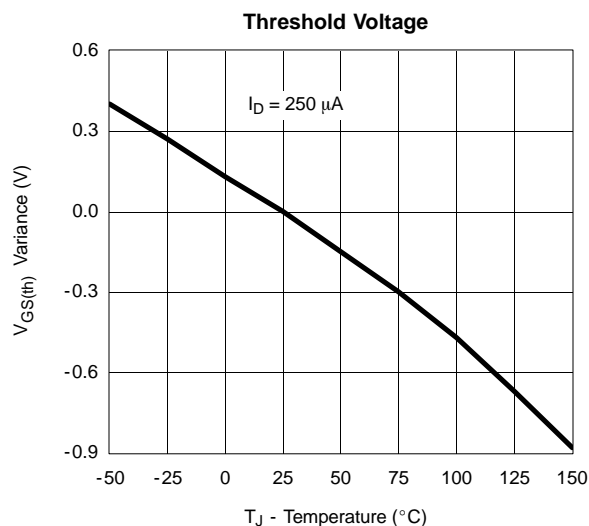
Parameter	Symbol	Test Condition	Min	Typ	Max	Unit
<b>Static</b>						
Gate Threshold Voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}$ , $I_D = 250\ \mu\text{A}$	1.0		3.0	V
Gate-Body Leakage	$I_{GSS}$	$V_{DS} = 0\ \text{V}$ , $V_{GS} = \pm 20\ \text{V}$			$\pm 100$	nA
Zero Gate Voltage Drain Current	$I_{DSS}$	$V_{DS} = 30\ \text{V}$ , $V_{GS} = 0\ \text{V}$			1	$\mu\text{A}$
		$V_{DS} = 30\ \text{V}$ , $V_{GS} = 0\ \text{V}$ , $T_J = 70^\circ\text{C}$			5	
On-State Drain Current <sup>a</sup>	$I_{D(on)}$	$V_{DS} \geq 5\ \text{V}$ , $V_{GS} = 10\ \text{V}$	40			A
Drain-Source On-State Resistance <sup>a</sup>	$r_{DS(on)}$	$V_{GS} = 10\ \text{V}$ , $I_D = 16\ \text{A}$		0.0079	0.0095	$\Omega$
		$V_{GS} = 4.5\ \text{V}$ , $I_D = 14\ \text{A}$		0.0105	0.0125	
Forward Transconductance <sup>a</sup>	$g_{fs}$	$V_{DS} = 15\ \text{V}$ , $I_D = 16\ \text{A}$		60		S
Diode Forward Voltage <sup>a</sup>	$V_{SD}$	$I_S = 3\ \text{A}$ , $V_{GS} = 0\ \text{V}$		0.70	1.1	V
<b>Dynamic<sup>b</sup></b>						
Total Gate Charge	$Q_g$	$V_{DS} = 15\ \text{V}$ , $V_{GS} = 4.5\ \text{V}$ , $I_D = 16\ \text{A}$		13	18	nC
Gate-Source Charge	$Q_{gs}$			5		
Gate-Drain Charge	$Q_{gd}$			4.0		
Gate-Resistance	$R_g$		0.5	1.7	3.2	$\Omega$
Turn-On Delay Time	$t_{d(on)}$	$V_{DD} = 15\ \text{V}$ , $R_L = 15\ \Omega$ $I_D \cong 1\ \text{A}$ , $V_{GEN} = 10\ \text{V}$ , $R_G = 6\ \Omega$		18	27	ns
Rise Time	$t_r$			12	18	
Turn-Off Delay Time	$t_{d(off)}$			46	70	
Fall Time	$t_f$			19	30	
Source-Drain Reverse Recovery Time	$t_{rr}$	$I_F = 3\ \text{A}$ , $di/dt = 100\ \text{A}/\mu\text{s}$		40	70	

## Notes

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

**TYPICAL CHARACTERISTICS ( $25^\circ\text{C}$  UNLESS NOTED)**

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