

## P-Channel 20-V (D-S) MOSFET

### Key Features:

- Low  $r_{DS(on)}$  trench technology
- Low thermal impedance
- Fast switching speed

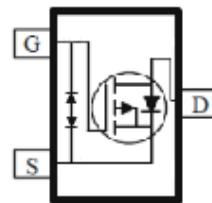
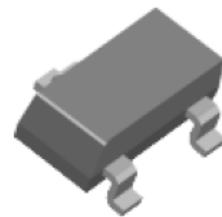
### Typical Applications:

- White LED boost converters
- Automotive Systems
- Industrial DC/DC Conversion Circuits

PRODUCT SUMMARY		
$V_{DS}$ (V)	$r_{DS(on)}$ (mΩ)	$I_D$ (A)
-20	43 @ $V_{GS} = -4.5V$	-4.5
	54 @ $V_{GS} = -2.5V$	-4.1
	120 @ $V_{GS} = -1.8V$	-2.7



RoHS  
COMPLIANT  
HALOGEN  
FREE



ESD Protected

ABSOLUTE MAXIMUM RATINGS ( $T_A = 25^\circ C$ UNLESS OTHERWISE NOTED)				
Parameter		Symbol	Limit	Units
Drain-Source Voltage		$V_{DS}$	-20	V
Gate-Source Voltage		$V_{GS}$	$\pm 8$	
Continuous Drain Current <sup>a</sup>	$T_A = 25^\circ C$	$I_D$	-4.5	A
	$T_A = 70^\circ C$		-3.6	
Pulsed Drain Current <sup>b</sup>		$I_{DM}$	-20	
Continuous Source Current (Diode Conduction) <sup>a</sup>		$I_S$	-1.8	
Power Dissipation <sup>a</sup>	$T_A = 25^\circ C$	$P_D$	1.3	W
	$T_A = 70^\circ C$		0.8	
Operating Junction and Storage Temperature Range		$T_J, T_{stg}$	-55 to 150	°C

THERMAL RESISTANCE RATINGS				
Parameter		Symbol	Maximum	Units
Maximum Junction-to-Ambient <sup>a</sup>	$t \leq 10 \text{ sec}$	$R_{\theta JA}$	100	°C/W
	Steady State		166	

### Notes

- Surface Mounted on 1" x 1" FR4 Board.
- Pulse width limited by maximum junction temperature

## Electrical Characteristics

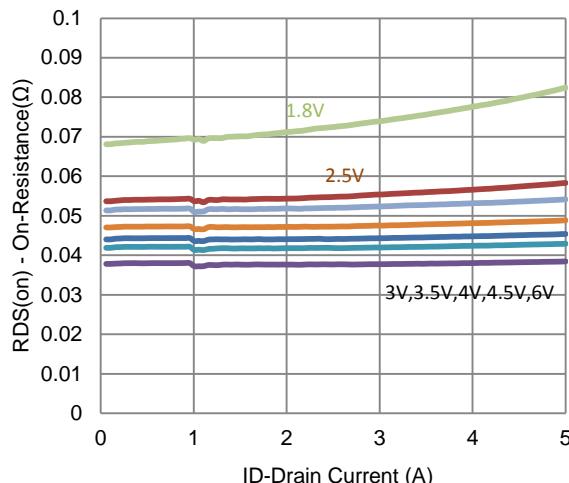
Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
<b>Static</b>						
Gate-Source Threshold Voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}$ , $I_D = -250 \mu A$	-0.4			V
Gate-Body Leakage	$I_{GSS}$	$V_{DS} = 0 V$ , $V_{GS} = \pm 8 V$			$\pm 10$	$\mu A$
Zero Gate Voltage Drain Current	$I_{DSS}$	$V_{DS} = -16 V$ , $V_{GS} = 0 V$			-1	
		$V_{DS} = -16 V$ , $V_{GS} = 0 V$ , $T_J = 55^\circ C$			-25	$\mu A$
On-State Drain Current <sup>a</sup>	$I_{D(on)}$	$V_{DS} = -5 V$ , $V_{GS} = -4.5 V$	-10			A
Drain-Source On-Resistance <sup>a</sup>	$r_{DS(on)}$	$V_{GS} = -4.5 V$ , $I_D = -3.7 A$			43	$m\Omega$
		$V_{GS} = -2.5 V$ , $I_D = -3 A$			54	
		$V_{GS} = -1.8 V$ , $I_D = -2.4 A$			120	
Forward Transconductance <sup>a</sup>	$g_{fs}$	$V_{DS} = -10 V$ , $I_D = -3.7 A$		15		S
Diode Forward Voltage <sup>a</sup>	$V_{SD}$	$I_S = -0.9 A$ , $V_{GS} = 0 V$		-0.73		V
<b>Dynamic <sup>b</sup></b>						
Total Gate Charge	$Q_g$	$V_{DS} = -10 V$ , $V_{GS} = -4.5 V$ , $I_D = -3.7 A$		11		$nC$
Gate-Source Charge	$Q_{gs}$			2.1		
Gate-Drain Charge	$Q_{gd}$			2.9		
Turn-On Delay Time	$t_{d(on)}$	$V_{DS} = -10 V$ , $R_L = 2.8 \Omega$ , $I_D = -3.7 A$ , $V_{GEN} = -4.5 V$ , $R_{GEN} = 6 \Omega$		10		$ns$
Rise Time	$t_r$			11		
Turn-Off Delay Time	$t_{d(off)}$			56		
Fall Time	$t_f$			20		
Input Capacitance	$C_{iss}$	$V_{DS} = -15 V$ , $V_{GS} = 0 V$ , $f = 1 MHz$		697		$pF$
Output Capacitance	$C_{oss}$			80		
Reverse Transfer Capacitance	$C_{rss}$			70		

## Notes

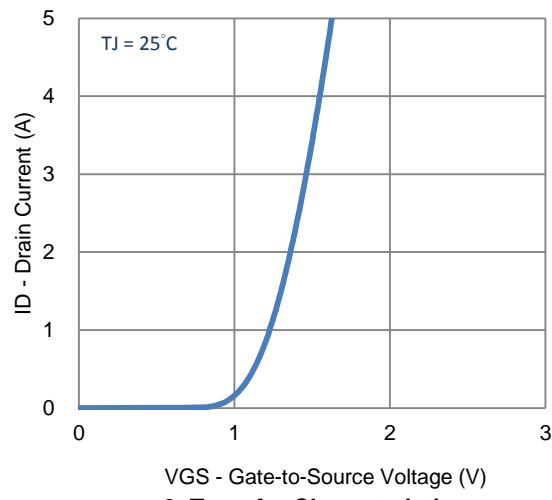
- a. Pulse test: PW <= 300us duty cycle <= 2%.
- b. Guaranteed by design, not subject to production testing.

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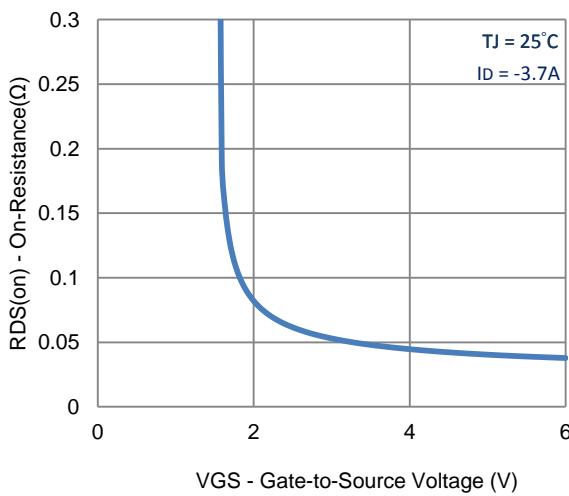
## Typical Electrical Characteristics



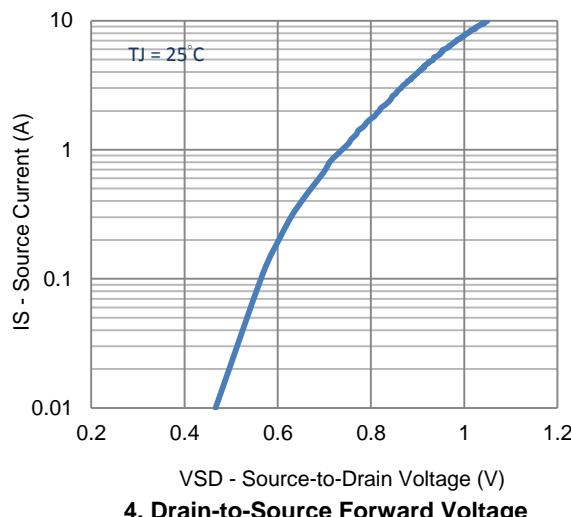
1. On-Resistance vs. Drain Current



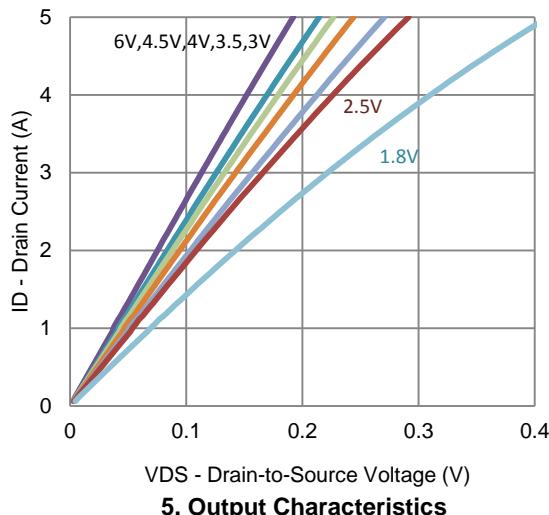
2. Transfer Characteristics



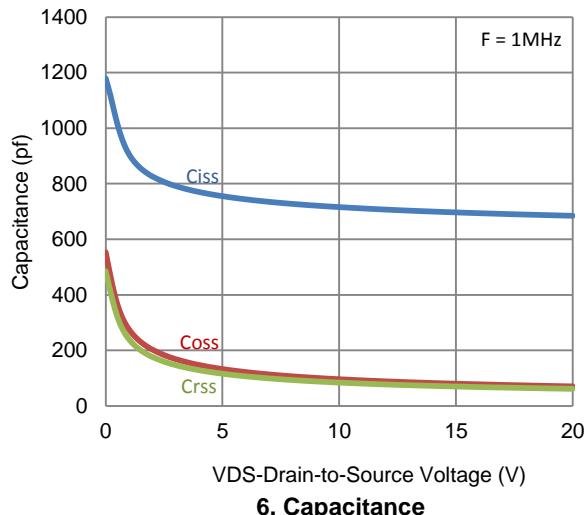
3. On-Resistance vs. Gate-to-Source Voltage



4. Drain-to-Source Forward Voltage

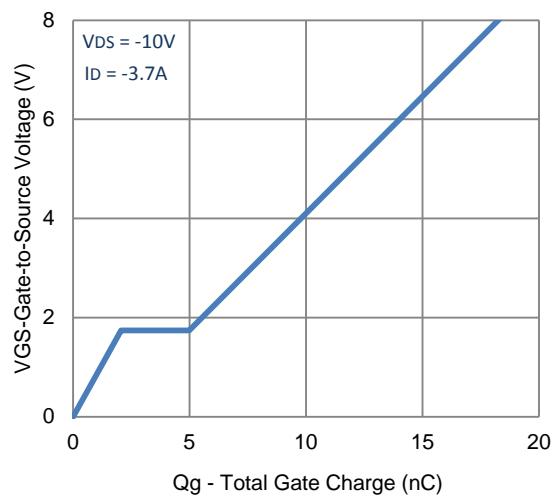


5. Output Characteristics

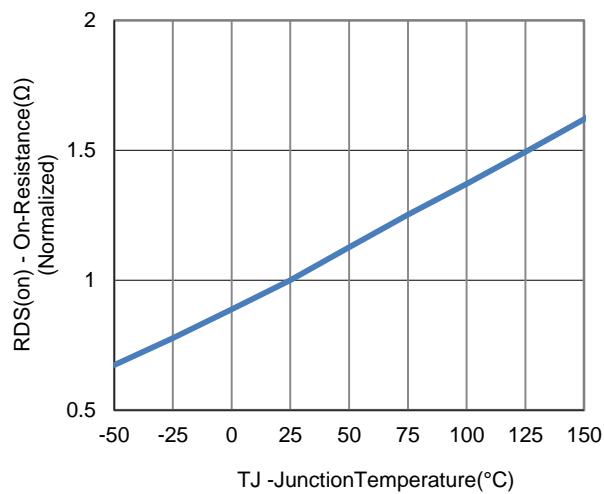


6. Capacitance

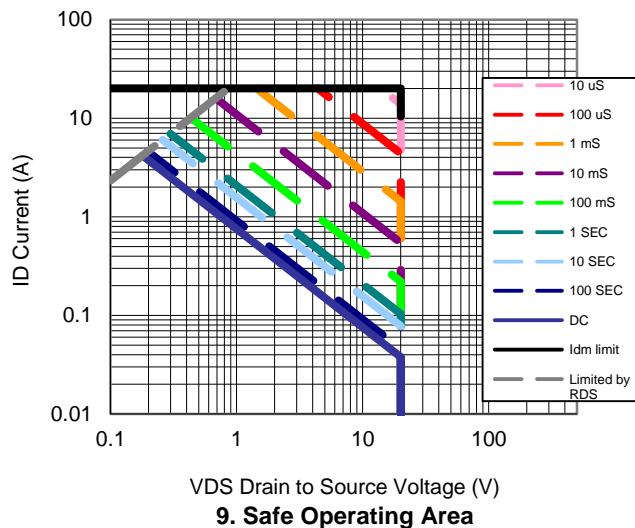
## Typical Electrical Characteristics



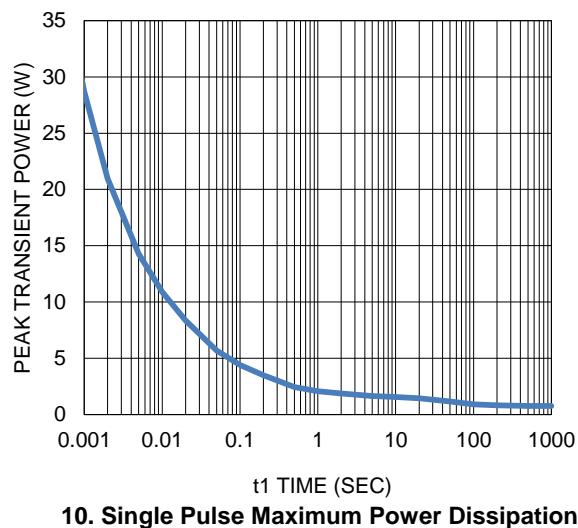
7. Gate Charge



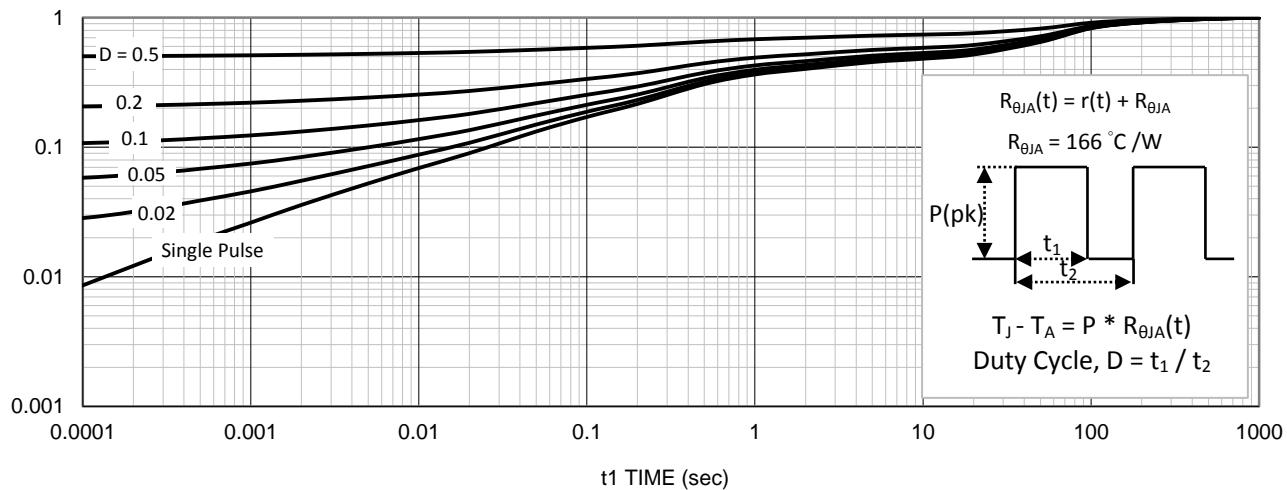
8. Normalized On-Resistance Vs Junction Temperature



9. Safe Operating Area

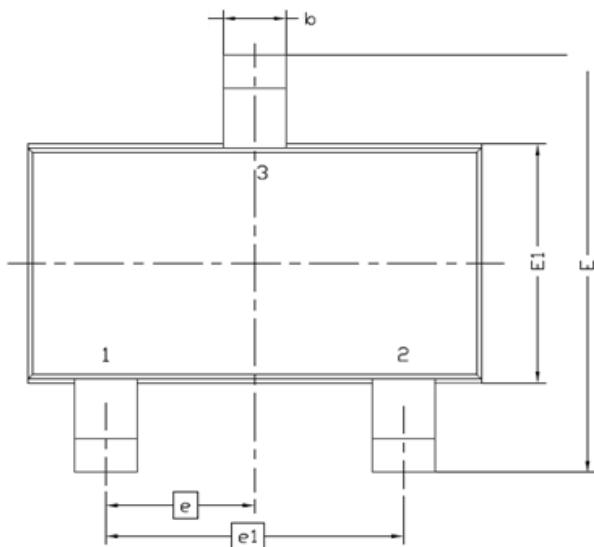


10. Single Pulse Maximum Power Dissipation

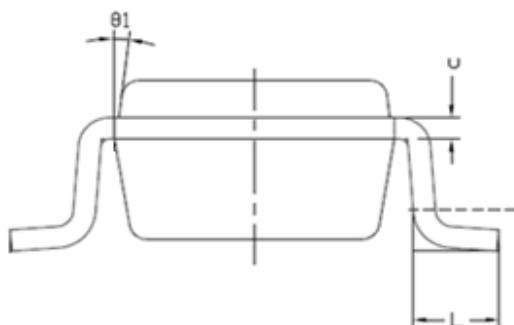
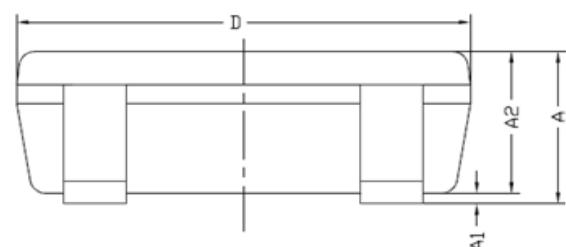


11. Normalized Thermal Transient Junction to Ambient

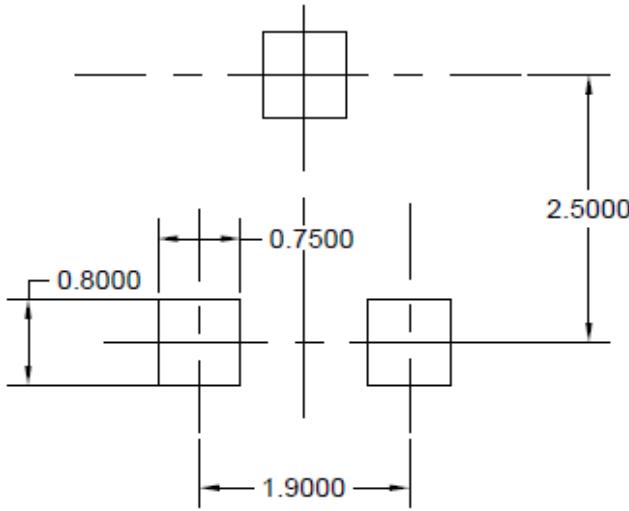
## Package Information



Symbol	MILLIMETERS	
	MIN	MAX
A	0.8	1.2
A1	0	0.1
A2	0.7	1.1
b	0.3	0.5
c	0.1	0.2
D	2.7	3.1
E	2.6	3
E1	1.4	1.8
e	0.95 BSC	
e1	1.9 BSC	
L	0.3	0.6
θ1	7° NOM	



## Recommended Pad Layout



Note: Drain opening is recommended to be solder mask defined in a copper fill for improved thermal performance

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