

## N-Channel 650-V (D-S) MOSFET

### Key Features:

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

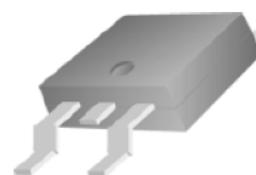
### Typical Applications:

- Power Supplies
- Motor Drives
- Consumer Electronics

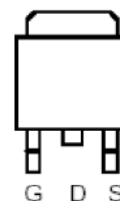
PRODUCT SUMMARY		
$V_{DS}$ (V)	$r_{DS(on)}$ (m $\Omega$ )	$I_D$ (A)
650	190 @ $V_{GS} = 10V$	33



RoHS  
COMPLIANT  
HALOGEN  
FREE



TO-263



Top View

ABSOLUTE MAXIMUM RATINGS ( $T_A = 25^\circ\text{C}$ UNLESS OTHERWISE NOTED)				
Parameter		Symbol	Limit	Units
Drain-Source Voltage		$V_{DS}$	650	V
Gate-Source Voltage		$V_{GS}$	$\pm 30$	
Continuous Drain Current <sup>a</sup>	$T_C = 25^\circ\text{C}$	$I_D$	33	A
Pulsed Drain Current <sup>b</sup>		$I_{DM}$	130	
Continuous Source Current (Diode Conduction) <sup>a</sup>	$T_C = 25^\circ\text{C}$	$I_S$	33	A
Power Dissipation <sup>a</sup>	$T_C = 25^\circ\text{C}$	$P_D$	300	W
Operating Junction and Storage Temperature Range		$T_J, T_{stg}$	-55 to 175	$^\circ\text{C}$

THERMAL RESISTANCE RATINGS			
Parameter	Symbol	Maximum	Units
Maximum Junction-to-Ambient <sup>c</sup>	$R_{\theta JA}$	62.5	$^\circ\text{C/W}$
Maximum Junction-to-Case	$R_{\theta JC}$	0.5	

### Notes

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

## Electrical Characteristics

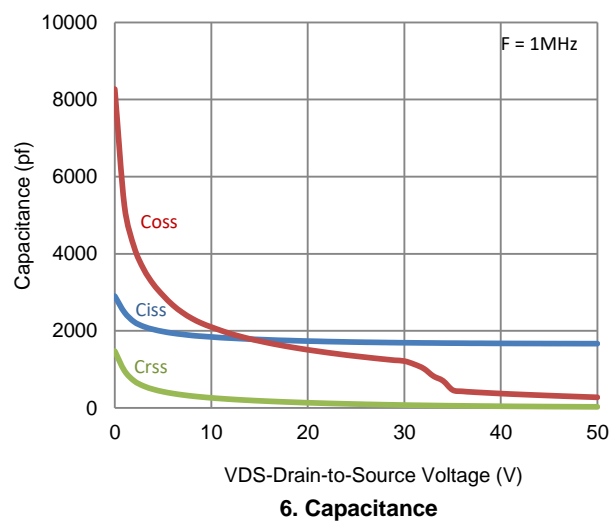
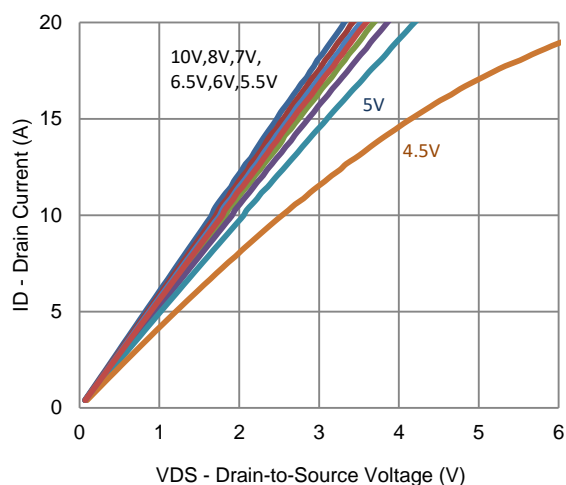
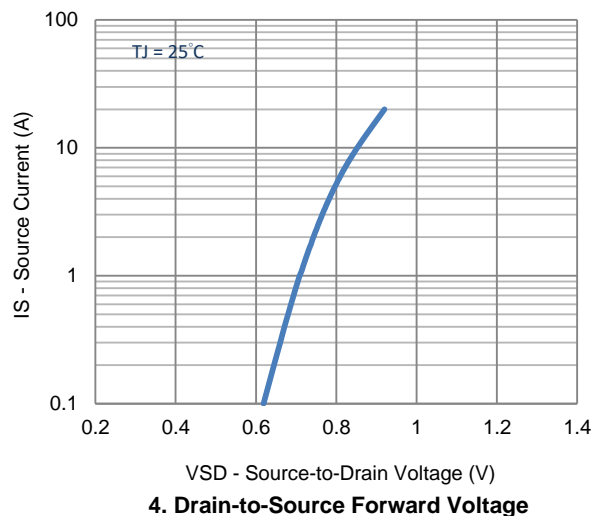
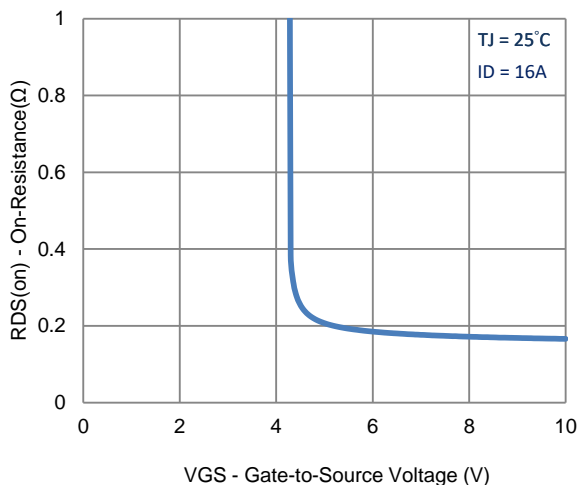
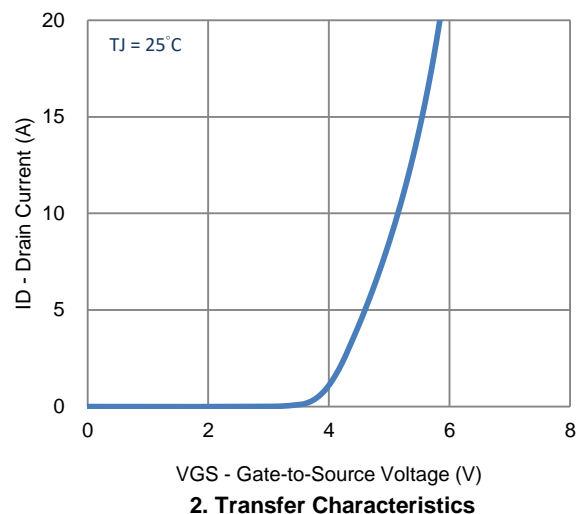
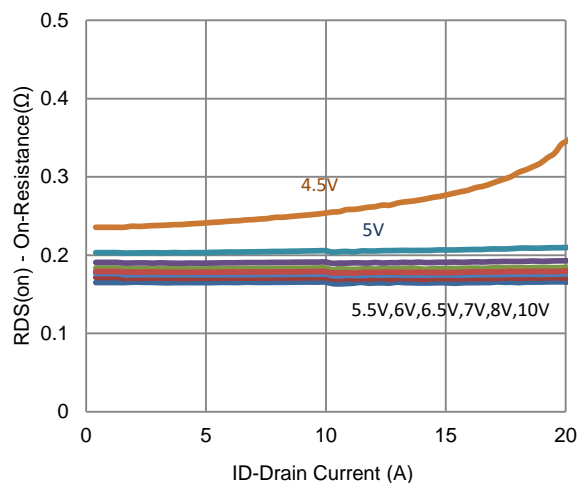
Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
<b>Static</b>						
Gate-Source Threshold Voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}$ , $I_D = 250 \mu A$	1			V
Gate-Body Leakage	$I_{GSS}$	$V_{DS} = 0 V$ , $V_{GS} = \pm 30 V$			$\pm 100$	nA
Zero Gate Voltage Drain Current	$I_{DSS}$	$V_{DS} = 520 V$ , $V_{GS} = 0 V$			1	$\mu A$
		$V_{DS} = 520 V$ , $V_{GS} = 0 V$ , $T_J = 55^\circ C$			10	
On-State Drain Current <sup>a</sup>	$I_{D(on)}$	$V_{DS} = 5 V$ , $V_{GS} = 10 V$	45			A
Drain-Source On-Resistance <sup>a</sup>	$r_{DS(on)}$	$V_{GS} = 10 V$ , $I_D = 16 A$			190	m $\Omega$
Forward Transconductance <sup>a</sup>	$g_{fs}$	$V_{DS} = 50 V$ , $I_D = 16 A$		12		S
Diode Forward Voltage <sup>a</sup>	$V_{SD}$	$I_S = 16 A$ , $V_{GS} = 0 V$		1		V
<b>Dynamic <sup>b</sup></b>						
Total Gate Charge	$Q_g$	$V_{DS} = 325 V$ , $V_{GS} = 10 V$ , $I_D = 16 A$		47		nC
Gate-Source Charge	$Q_{gs}$			12.4		
Gate-Drain Charge	$Q_{gd}$			17.6		
Turn-On Delay Time	$t_{d(on)}$	$V_{DS} = 325 V$ , $R_L = 20.3 \Omega$ , $I_D = 16 A$ , $V_{GEN} = 10 V$ , $R_{GEN} = 6 \Omega$		13		ns
Rise Time	$t_r$			16		
Turn-Off Delay Time	$t_{d(off)}$			172		
Fall Time	$t_f$			103		
Input Capacitance	$C_{iss}$	$V_{DS} = 50 V$ , $V_{GS} = 0 V$ , $f = 1 Mhz$		1667		pF
Output Capacitance	$C_{oss}$			275		
Reverse Transfer Capacitance	$C_{rss}$			28		

## Notes

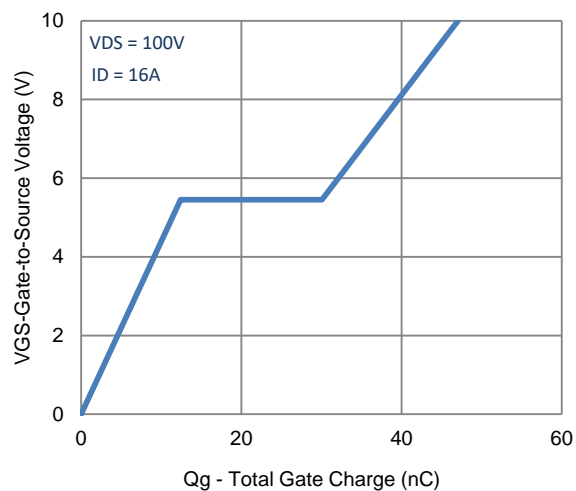
- Pulse test: PW  $\leq 300 \mu s$  duty cycle  $\leq 2\%$ .
- Guaranteed by design, not subject to production testing.

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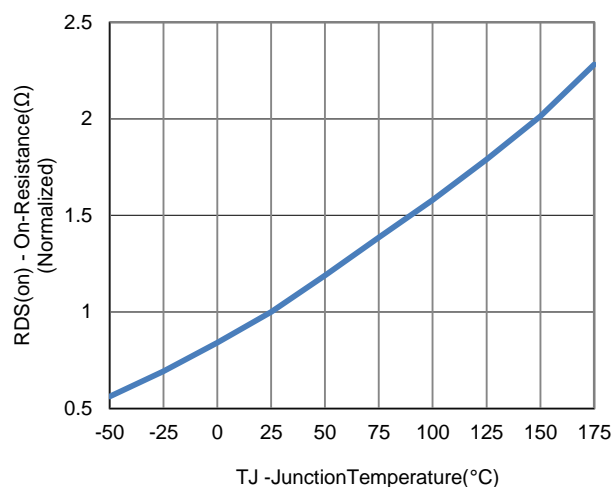
## Typical Electrical Characteristics



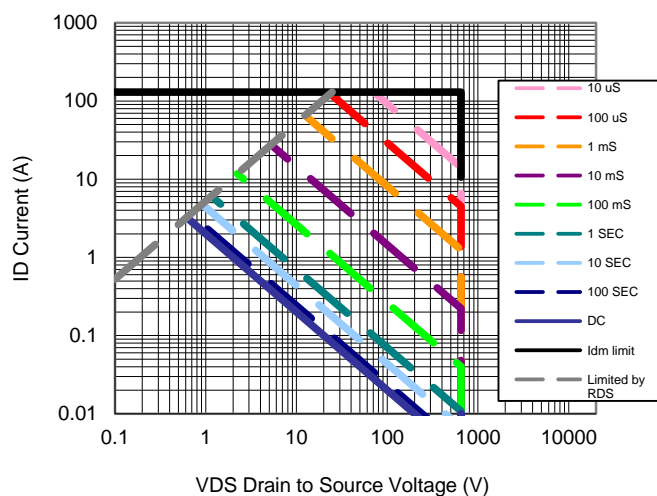
## Typical Electrical Characteristics



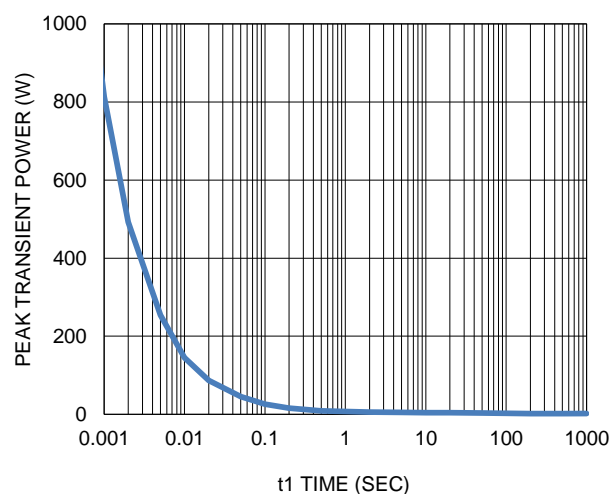
7. Gate Charge



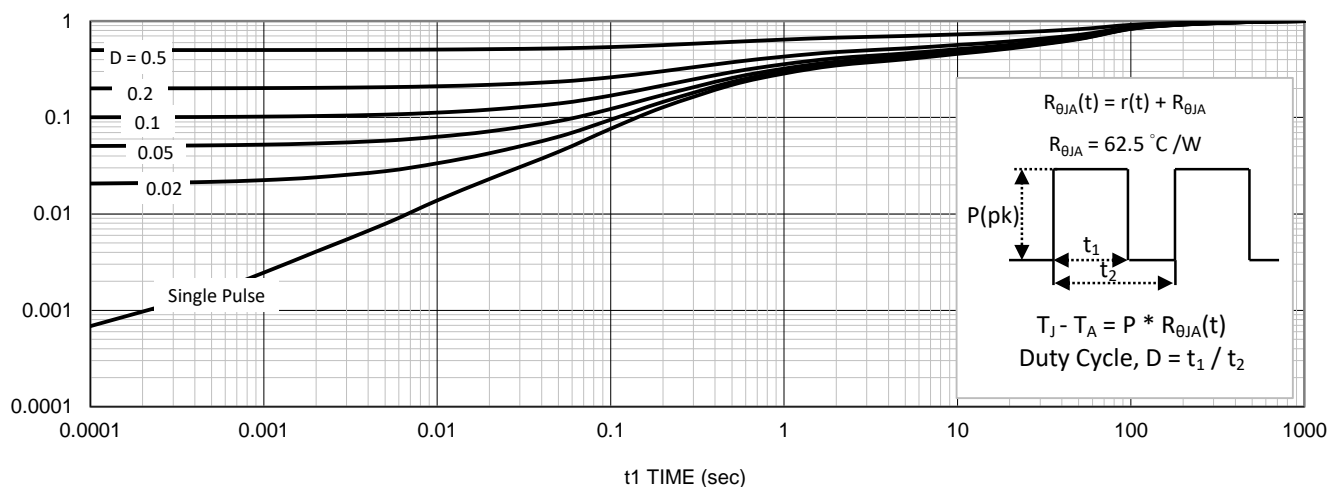
8. Normalized On-Resistance Vs Junction Temperature



9. Safe Operating Area

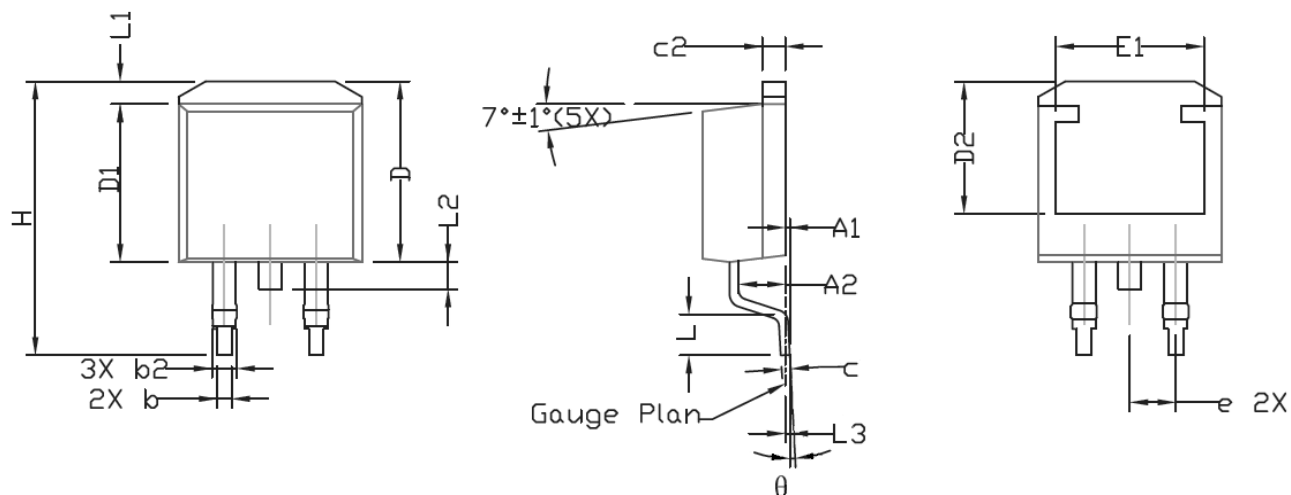


10. Single Pulse Maximum Power Dissipation



11. Normalized Thermal Transient Junction to Ambient

## Package Information



SYMBOL	DIMENSIONAL REQMTS			INCHES REQMTS		
	MTN	NOM	MAX	MTN	NOM	MAX
A	4.30	4.57	4.72	0.169	0.180	0.186
A1	0	---	0.25	0	---	0.010
A2	2.47	2.57	2.67	0.097	0.101	0.105
b	0.69	0.813	0.94	0.027	0.032	0.037
b2	1.17	1.27	1.45	0.046	0.050	0.057
c	0.48	0.50	0.60	0.019	0.020	0.024
c2	1.17	1.27	1.37	0.046	0.050	0.054
D	9.80	10.05	10.30	0.386	0.396	0.406
D1	8.64	8.78	9.65	0.340	0.346	0.380
D2	7.12	7.37	7.62	0.280	0.290	0.300
E	9.70	10.15	10.54	0.382	0.400	0.415
E1	8.00	8.20	8.40	0.315	0.323	0.331
e	2.54 BSC			0.100 BSC		
H	14.99	15.24	15.49	0.590	0.600	0.610
L	1.78	2.29	2.79	0.070	0.090	0.110
L1	1.02	1.27	1.52	0.040	0.050	0.060
L2	---	---	1.75	---	---	0.069
L3	---	0.254	---	---	0.010	---
θ	0°	---	8°	0°	---	8°