

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

### Key Features:

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

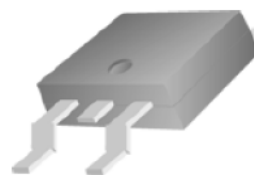
### Typical Applications:

- Power Supplies
- Motor Drives
- Consumer Electronics

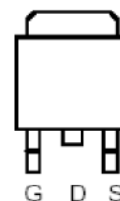
PRODUCT SUMMARY		
$V_{DS}$ (V)	$r_{DS(on)}$ (m $\Omega$ )	$I_D$ (A)
650	380 @ $V_{GS} = 10V$	23



**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>	$I_D$	23	A
Pulsed Drain Current <sup>b</sup>	$I_{DM}$	100	
Continuous Source Current (Diode Conduction) <sup>a</sup>	$I_S$	23	A
Power Dissipation <sup>a</sup>	$P_D$	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

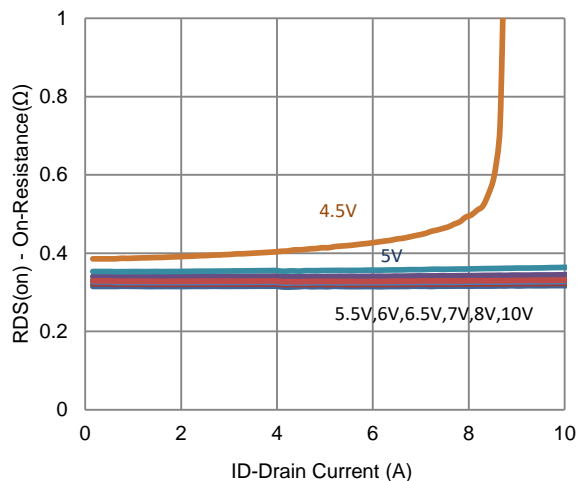
Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
<b>Static</b>						
Gate-Source Threshold Voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}, I_D = 250 \mu A$	1			V
Gate-Body Leakage	$I_{GSS}$	$V_{DS} = 0 V, V_{GS} = \pm 30 V$			$\pm 100$	nA
Zero Gate Voltage Drain Current	$I_{DSS}$	$V_{DS} = 520 V, V_{GS} = 0 V$			1	uA
		$V_{DS} = 520 V, V_{GS} = 0 V, T_J = 55^\circ C$			10	
On-State Drain Current <sup>a</sup>	$I_{D(on)}$	$V_{DS} = 5 V, V_{GS} = 10 V$	35			A
Drain-Source On-Resistance <sup>a</sup>	$r_{DS(on)}$	$V_{GS} = 10 V, I_D = 10 A$			380	m $\Omega$
Forward Transconductance <sup>a</sup>	$g_{fs}$	$V_{DS} = 50 V, I_D = 10 A$		12		S
Diode Forward Voltage <sup>a</sup>	$V_{SD}$	$I_S = 15 A, V_{GS} = 0 V$		1		V
<b>Dynamic <sup>b</sup></b>						
Total Gate Charge	$Q_g$	$V_{DS} = 325 V, V_{GS} = 10 V,$ $I_D = 10 A$		20		nC
Gate-Source Charge	$Q_{gs}$			4.7		
Gate-Drain Charge	$Q_{gd}$			7.7		
Turn-On Delay Time	$t_{d(on)}$	$V_{DS} = 325 V, R_L = 32.5 \Omega,$ $I_D = 10 A,$ $V_{GEN} = 10 V, R_{GEN} = 6 \Omega$		10		ns
Rise Time	$t_r$			12		
Turn-Off Delay Time	$t_{d(off)}$			96		
Fall Time	$t_f$			57		
Input Capacitance	$C_{iss}$	$V_{DS} = 50, V_{GS} = 0 V, f = 1 Mhz$		734		pF
Output Capacitance	$C_{oss}$			121		
Reverse Transfer Capacitance	$C_{rss}$			12		

## Notes

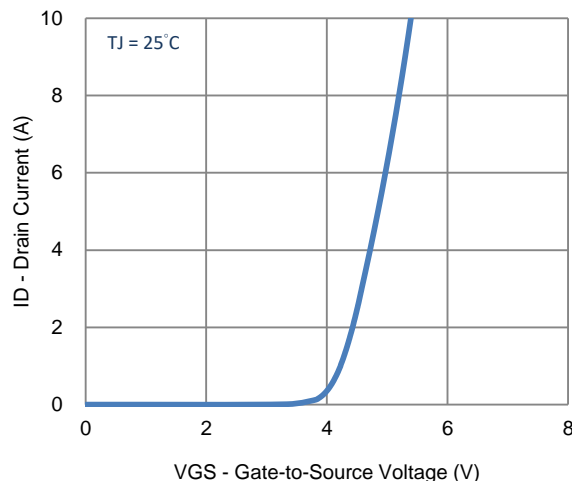
- Pulse test: PW  $\leq$  300us duty cycle  $\leq$  2%.
- Guaranteed by design, not subject to production testing.

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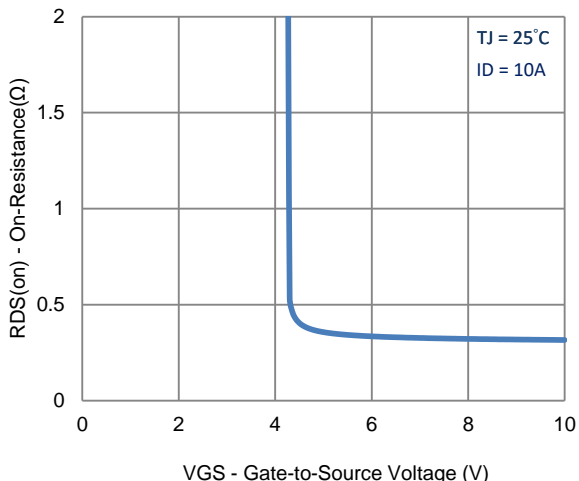
Typical Electrical Characteristics



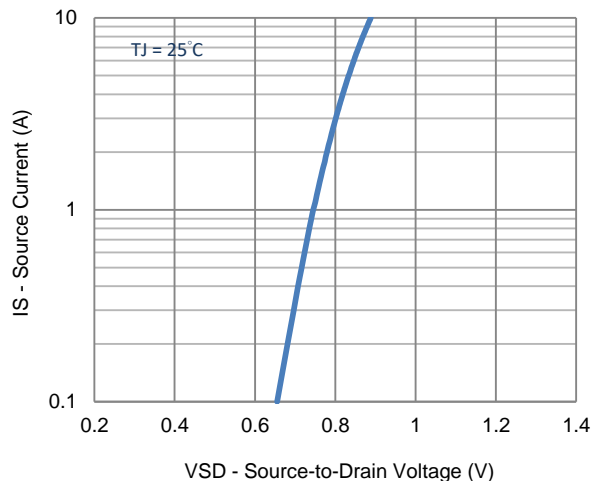
1. On-Resistance vs. Drain Current



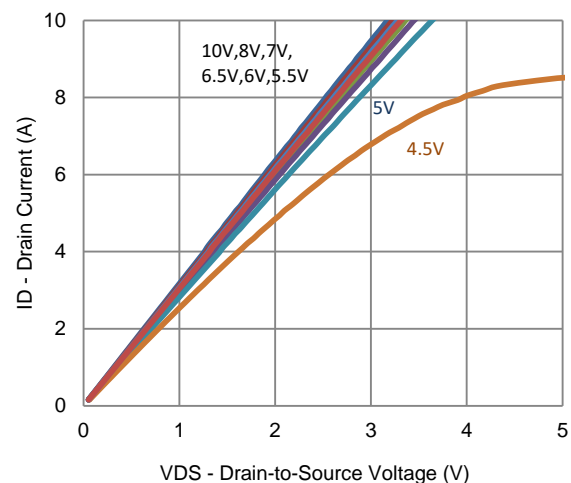
2. Transfer Characteristics



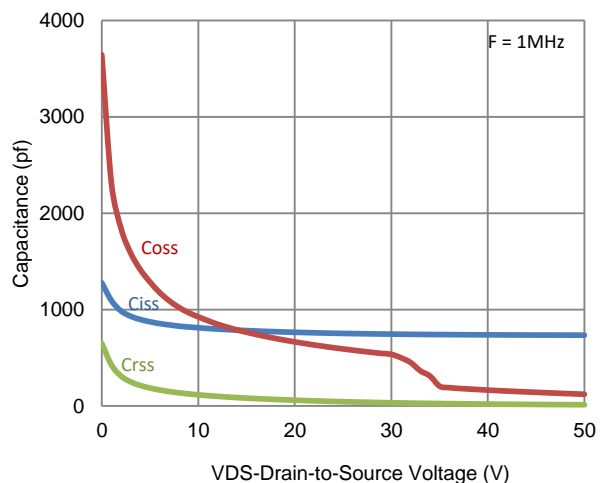
3. On-Resistance vs. Gate-to-Source Voltage



4. Drain-to-Source Forward Voltage

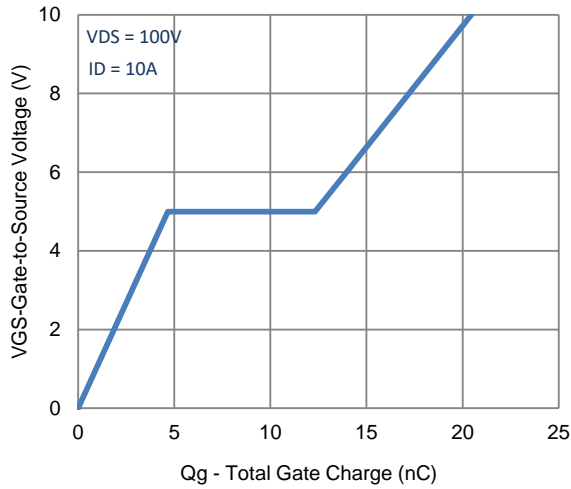


5. Output Characteristics

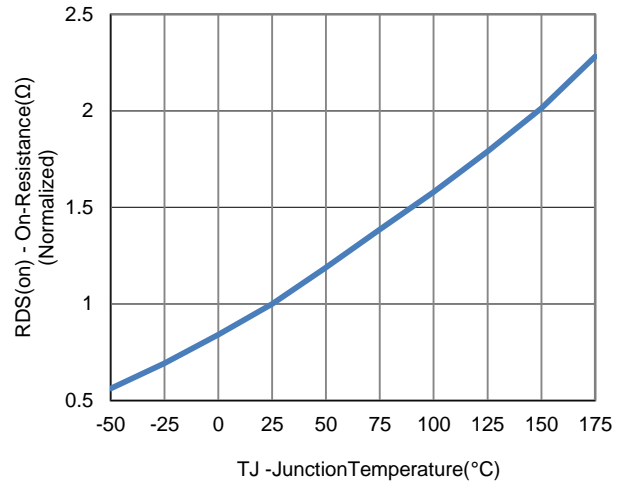


6. Capacitance

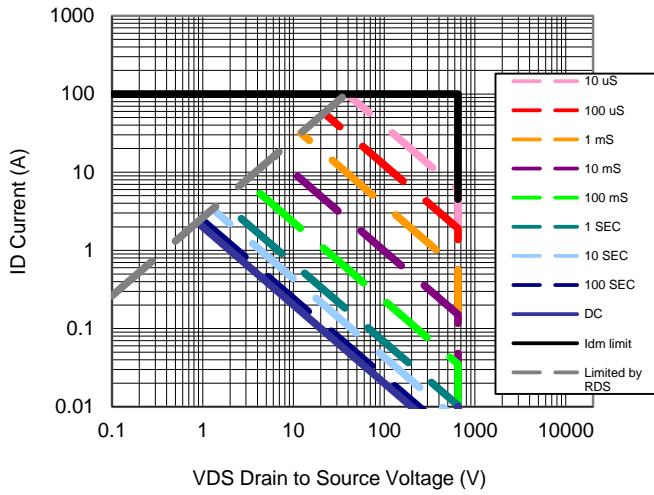
Typical Electrical Characteristics



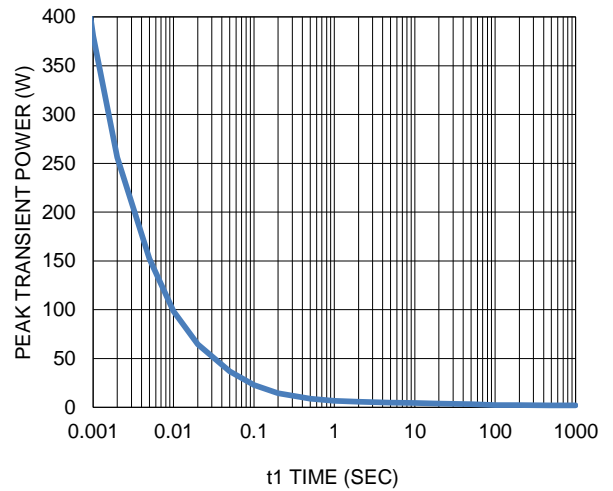
7. Gate Charge



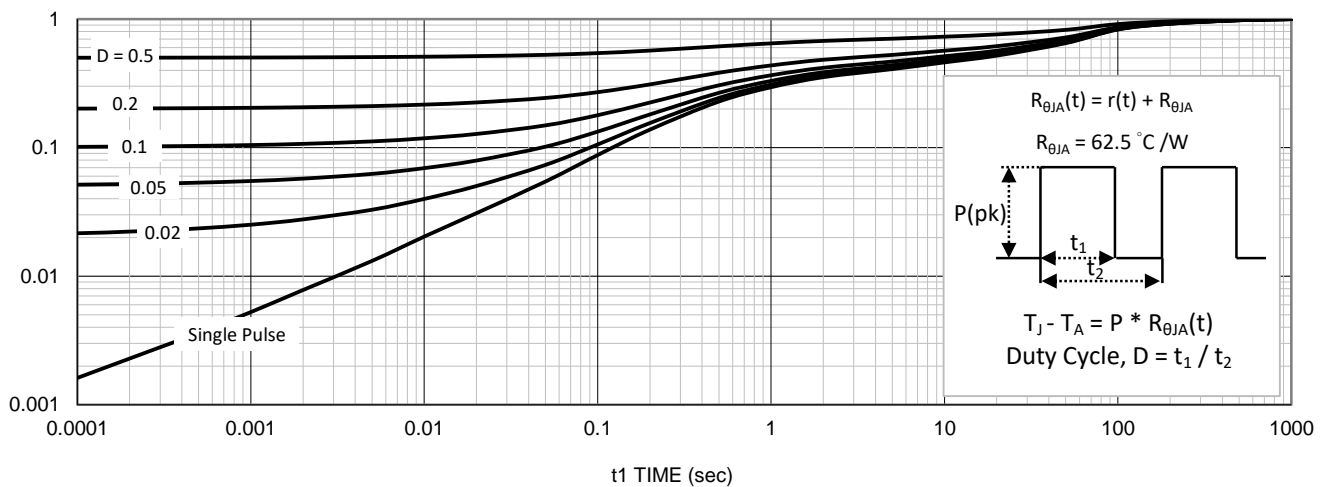
8. Normalized On-Resistance Vs Junction Temperature



9. Safe Operating Area

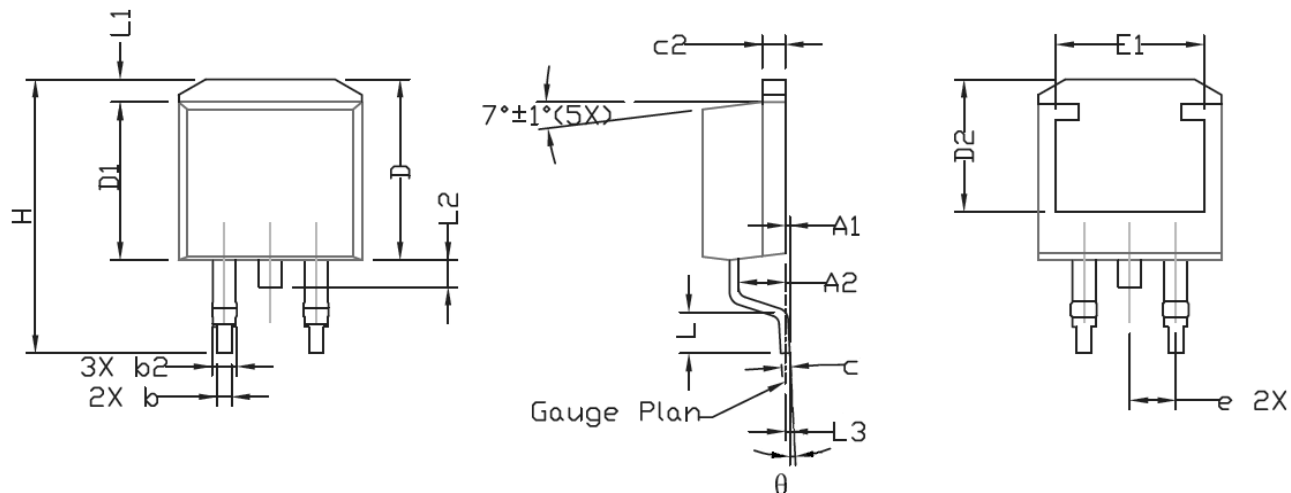


10. Single Pulse Maximum Power Dissipation



11. Normalized Thermal Transient Junction to Ambient

Package Information



SYMBOL	DIMENSIONAL REQMTS			INCHES REQMTS		
	MIN	NOM	MAX	MIN	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	---
$\theta$	0°	---	8°	0°	---	8°