

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

### Key Features:

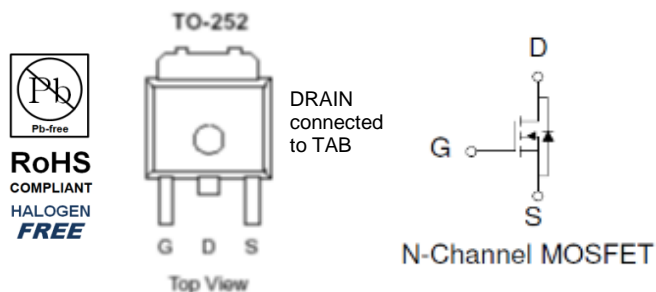
- Low  $r_{DS(on)}$  technology
- Low thermal impedance
- Fast switching speed

### Typical Applications:

- Power Supplies
- Motor Drives
- Consumer Electronics

### PRODUCT SUMMARY

$V_{DS}$ (V)	$r_{DS(on)}$ (m $\Omega$ )	$I_D$ (A)
650	380 @ $V_{GS} = 10V$	9



### 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>	$I_D$	9	A
Pulsed Drain Current <sup>b</sup>	$I_{DM}$	36	
Continuous Source Current (Diode Conduction) <sup>a</sup>	$I_S$	9	A
Power Dissipation <sup>a</sup>	$P_D$	50	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>	$R_{\theta JA}$	40	$^\circ\text{C/W}$
Maximum Junction-to-Case	$R_{\theta JC}$	3	

### Notes

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

## Electrical Characteristics

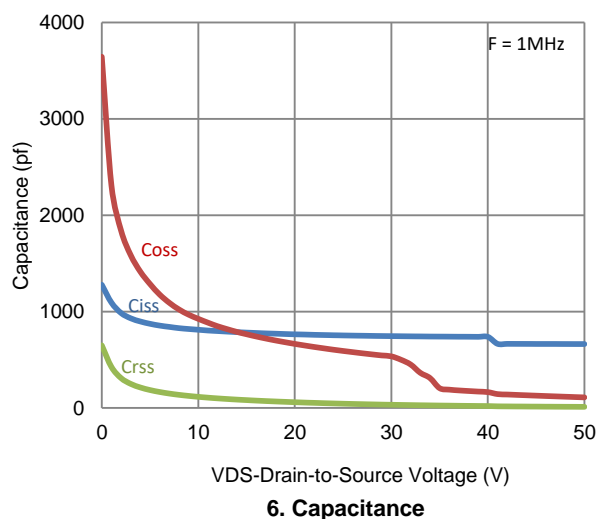
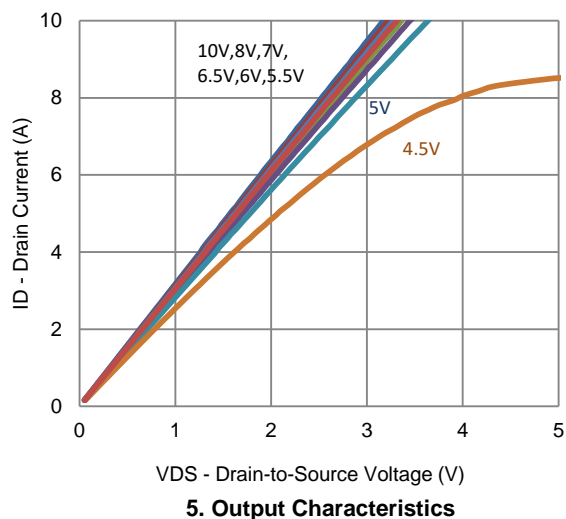
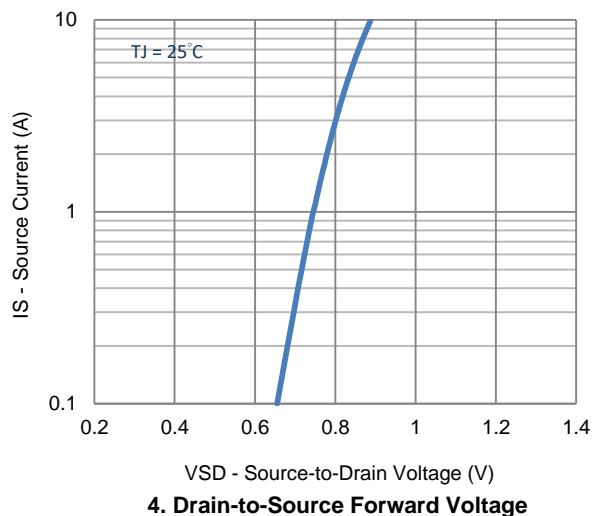
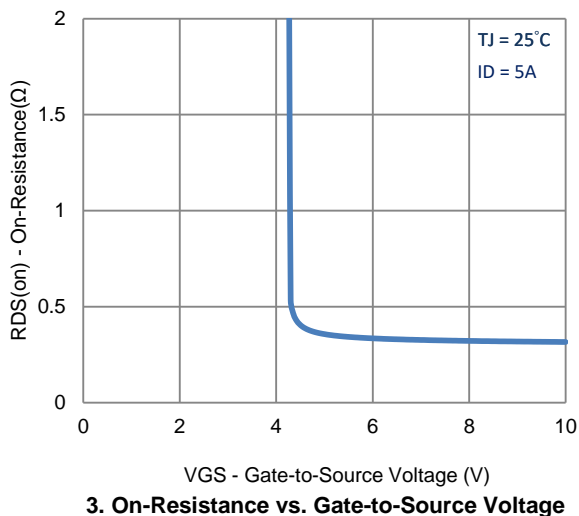
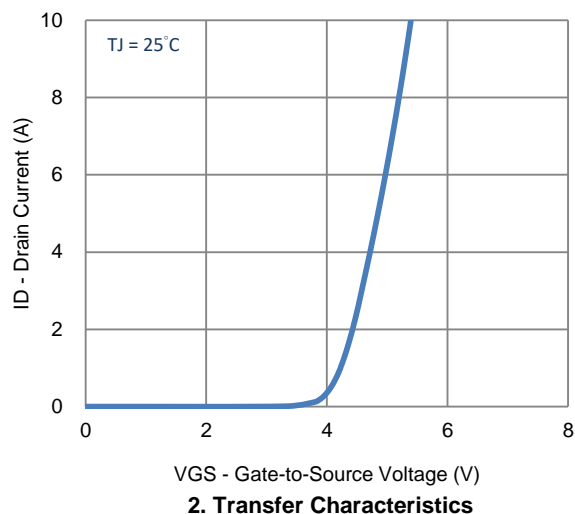
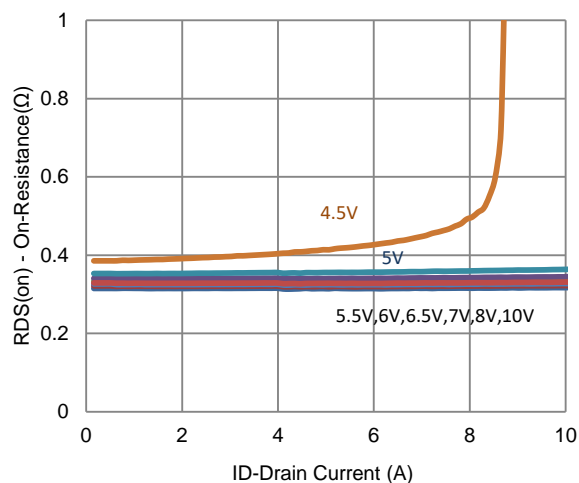
Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
<b>Static</b>						
Gate-Source Threshold Voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}$ , $I_D = 250 \mu A$	1			V
Gate-Body Leakage	$I_{GSS}$	$V_{DS} = 0 V$ , $V_{GS} = \pm 30 V$			$\pm 100$	nA
Zero Gate Voltage Drain Current	$I_{DSS}$	$V_{DS} = 520 V$ , $V_{GS} = 0 V$			1	$\mu A$
		$V_{DS} = 520 V$ , $V_{GS} = 0 V$ , $T_J = 55^\circ C$			10	
On-State Drain Current <sup>a</sup>	$I_{D(on)}$	$V_{DS} = 5 V$ , $V_{GS} = 10 V$	35			A
Drain-Source On-Resistance <sup>a</sup>	$r_{DS(on)}$	$V_{GS} = 10 V$ , $I_D = 5 A$			380	m $\Omega$
Forward Transconductance <sup>a</sup>	$g_{fs}$	$V_{DS} = 50 V$ , $I_D = 5 A$		12		S
Diode Forward Voltage <sup>a</sup>	$V_{SD}$	$I_S = 5 A$ , $V_{GS} = 0 V$		1		V
<b>Dynamic <sup>b</sup></b>						
Total Gate Charge	$Q_g$	$V_{DS} = 325 V$ , $V_{GS} = 10 V$ , $I_D = 5 A$		20		nC
Gate-Source Charge	$Q_{gs}$			4.7		
Gate-Drain Charge	$Q_{gd}$			7.7		
Turn-On Delay Time	$t_{d(on)}$	$V_{DS} = 325 V$ , $R_L = 65 \Omega$ , $I_D = 5 A$ , $V_{GEN} = 10 V$ , $R_{GEN} = 6 \Omega$		9		ns
Rise Time	$t_r$			12		
Turn-Off Delay Time	$t_{d(off)}$			89		
Fall Time	$t_f$			53		
Input Capacitance	$C_{iss}$	$V_{DS} = 50 V$ , $V_{GS} = 0 V$ , $f = 1 Mhz$		663		pF
Output Capacitance	$C_{oss}$			109		
Reverse Transfer Capacitance	$C_{rss}$			11		

## Notes

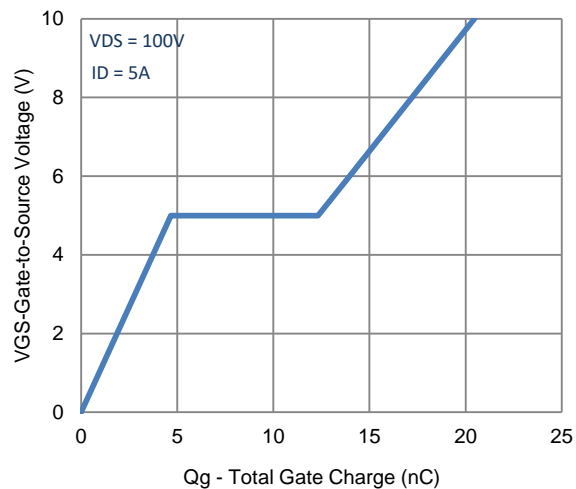
- a. Pulse test: PW  $\leq$  300 $\mu$ s duty cycle  $\leq$  2%.
- b. Guaranteed by design, not subject to production testing.

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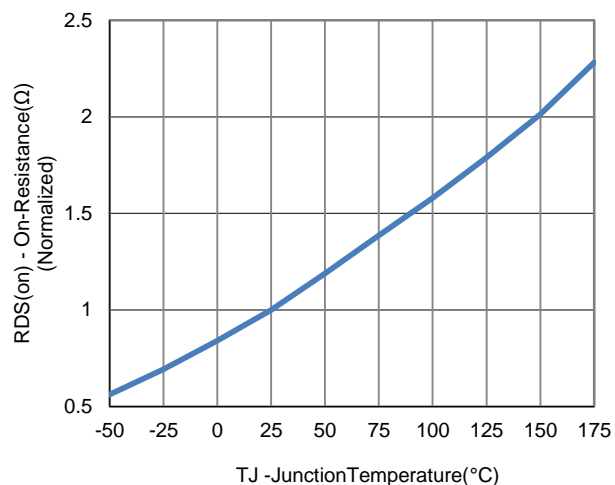
## Typical Electrical Characteristics



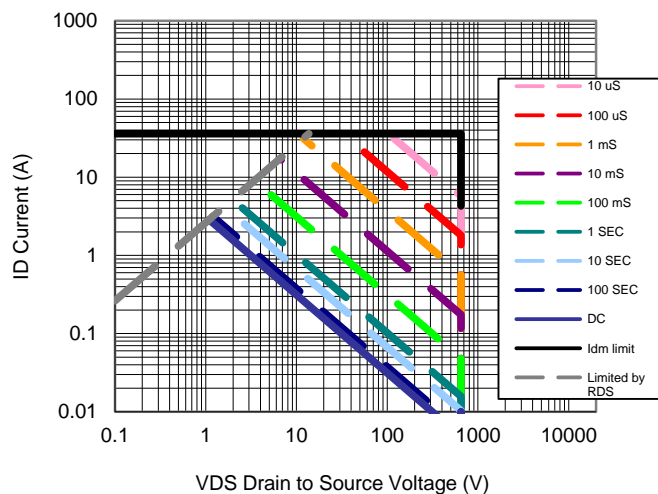
## Typical Electrical Characteristics



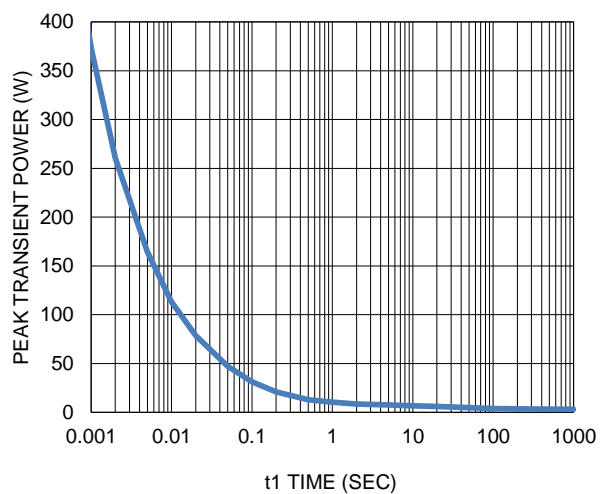
7. Gate Charge



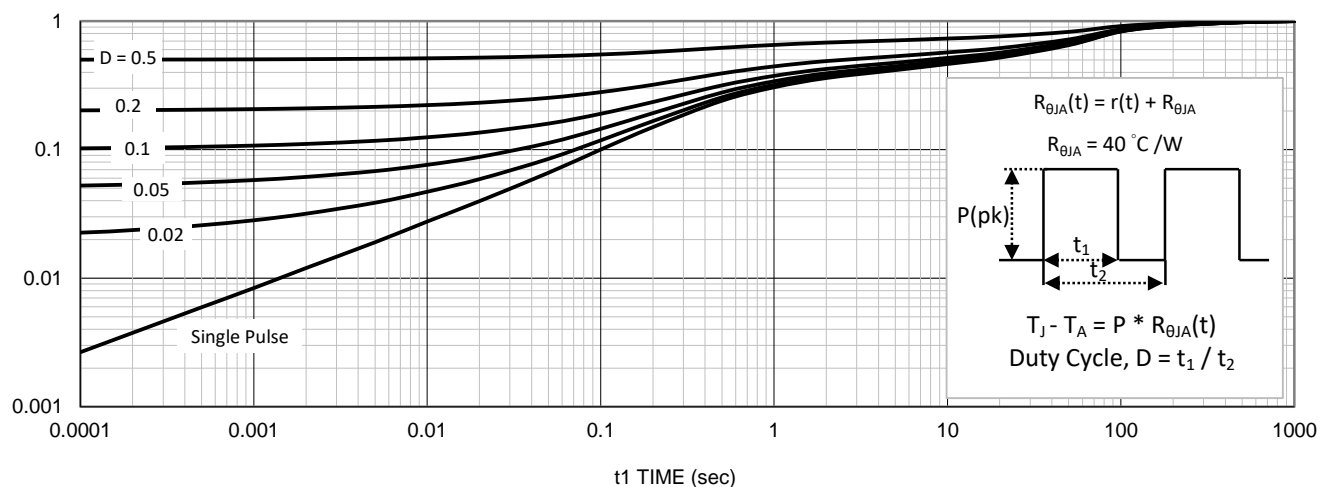
8. Normalized On-Resistance Vs Junction Temperature



9. Safe Operating Area

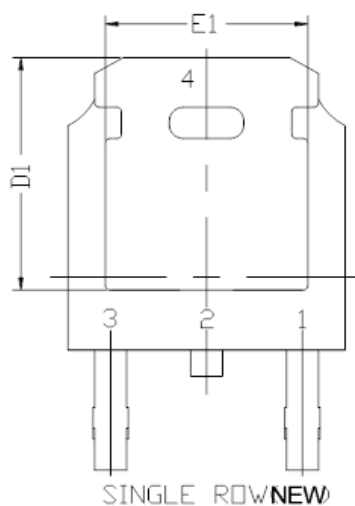
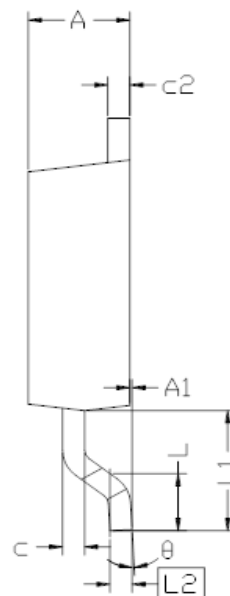
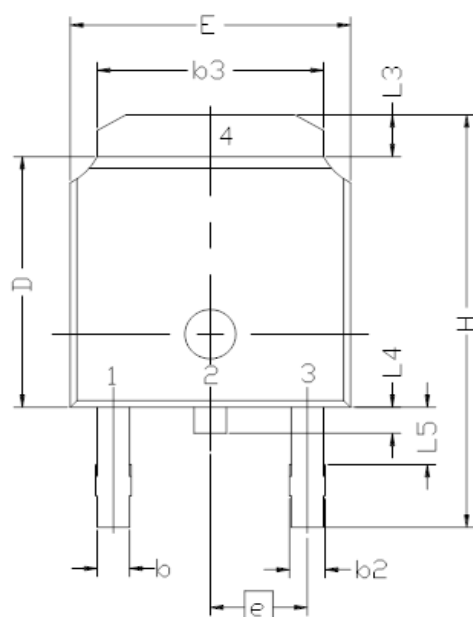


10. Single Pulse Maximum Power Dissipation



11. Normalized Thermal Transient Junction to Ambient

## Package Information



SYMBOL	DIMENSIONAL REQMTS		
	MIN	NOM	MAX
E	6.40	6.60	6.731
L	1.40	1.52	1.77
L1	2.743 REF		
L2	0.508 BSC		
L3	0.89	--	1.27
L4	0.64	--	1.01
L5	--	--	--
D	6.00	6.10	6.223
H	9.40	10.00	10.40
b	0.64	0.76	0.88
b2	0.77	0.84	1.14
b3	5.21	5.34	5.46
e	2.286 BSC		
A	2.20	2.30	2.38
A1	0	--	0.127
c	0.45	0.50	0.60
c2	0.45	0.50	0.58
D1	5.30	--	--
E1	4.40	--	--
θ	0°	--	10°

## Note:

1. All Dimension Are In mm.
2. Package Body Sizes Exclude Mold Flash, Protrusion Or Gate Burrs. Mold Flash, Protrusion Or Gate Burrs Shall Not Exceed 0.10 mm Per Side.
3. Package Body Sizes Determined At The Outermost Extremes Of The Plastic Body Exclusive Of Mold Flash, Gate Burrs And Interlead Flash, But Including Any Mismatch Between The Top And Bottom Of The Plastic Body.