N-Channel 40-V (D-S) MOSFET

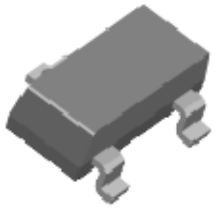
Key Features:
- Low $r_{DS(on)}$ trench technology
- Low thermal impedance
- Fast switching speed

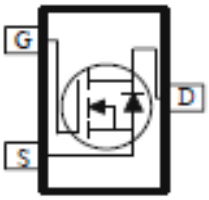
Typical Applications:
- White LED boost converters
- Automotive Systems
- Industrial DC/DC Conversion Circuits

PRODUCT SUMMARY		
V_{DS} (V)	$r_{DS(on)}$ (mΩ)	I_D(A)
40	43 @ V_{GS} = 10V	5.2
	64 @ V_{GS} = 4.5V	3.7

RoHS COMPLIANT HALOGEN FREE

SOT-23





ABSOLUTE MAXIMUM RATINGS (T_A = 25°C UNLESS OTHERWISE NOTED)				
Parameter		**Symbol**	**Limit**	**Units**
Drain-Source Voltage		V_{DS}	40	V
Gate-Source Voltage		V_{GS}	±20	
Continuous Drain Current [a]	T_A=25°C	I_D	5.2	A
	T_A=70°C		4.1	
Pulsed Drain Current [b]		I_{DM}	30	
Continuous Source Current (Diode Conduction) [a]		I_S	1.5	A
Power Dissipation [a]	T_A=25°C	P_D	1.3	W
	T_A=70°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 [a]	t <= 10 sec	$R_{\theta JA}$	100	°C/W
	Steady State		166	

Notes

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

b. Pulse width limited by maximum junction temperature

Electrical Characteristics

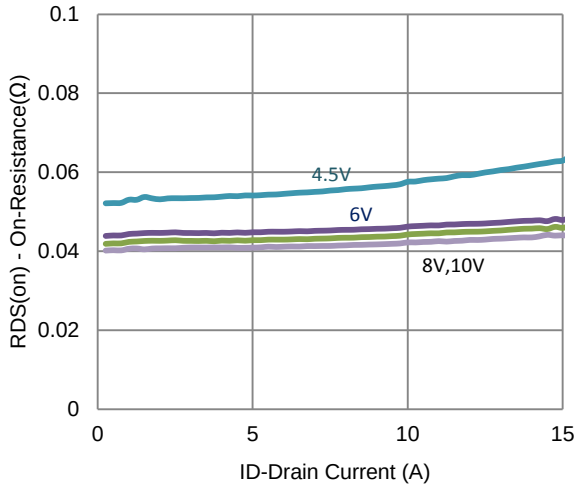
Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
Static						
Gate-Source Threshold Voltage	$V_{GS(th)}$	V_{DS} = V_{GS}, I_D = 250 uA	1			V
Gate-Body Leakage	I_{GSS}	V_{DS} = 0 V, V_{GS} = ±20 V			±100	nA
Zero Gate Voltage Drain Current	I_{DSS}	V_{DS} = 32 V, V_{GS} = 0 V			1	uA
		V_{DS} = 32 V, V_{GS} = 0 V, T_J = 55°C			25	
On-State Drain Current [a]	$I_{D(on)}$	V_{DS} = 5 V, V_{GS} = 10 V	10			A
Drain-Source On-Resistance [a]	$r_{DS(on)}$	V_{GS} = 10 V, I_D = 4.2 A			43	mΩ
		V_{GS} = 4.5 V, I_D = 3.3 A			64	
Forward Transconductance [a]	g_{fs}	V_{DS} = 15 V, I_D = 4.2 A		15		S
Diode Forward Voltage [a]	V_{SD}	I_S = 0.75 A, V_{GS} = 0 V		0.72		V
Dynamic [b]						
Total Gate Charge	Q_g	V_{DS} = 20 V, V_{GS} = 4.5 V, I_D = 4.2 A		3.5		nC
Gate-Source Charge	Q_{gs}			0.9		
Gate-Drain Charge	Q_{gd}			1.8		
Turn-On Delay Time	$t_{d(on)}$	V_{DS} = 20 V, R_L = 4.8 Ω, I_D = 4.2 A, V_{GEN} = 10 V, R_{GEN} = 6 Ω		3		ns
Rise Time	t_r			4		
Turn-Off Delay Time	$t_{d(off)}$			15		
Fall Time	t_f			5		
Input Capacitance	C_{iss}	V_{DS} = 15 V, V_{GS} = 0 V, f = 1 MHz		287		pF
Output Capacitance	C_{oss}			42		
Reverse Transfer Capacitance	C_{rss}			34		

Notes

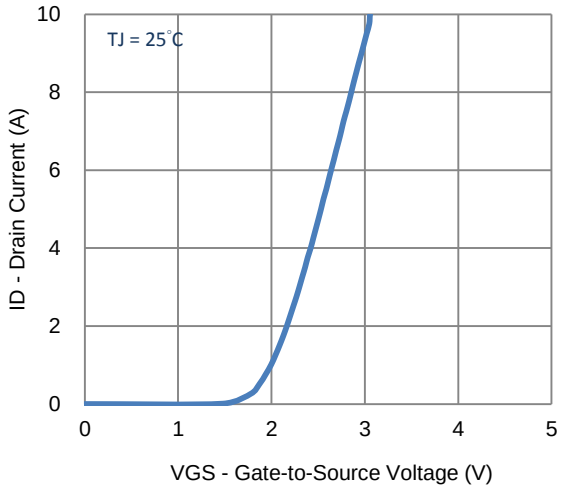
a. Pulse test: PW <= 300us duty cycle <= 2%.

b. Guaranteed by design, not subject to production testing.

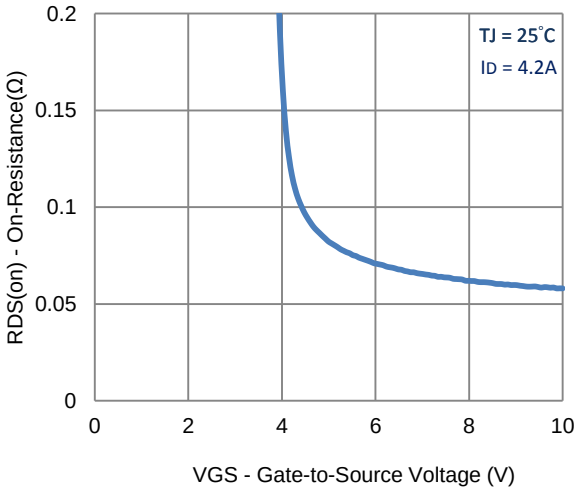
Typical Electrical Characteristics



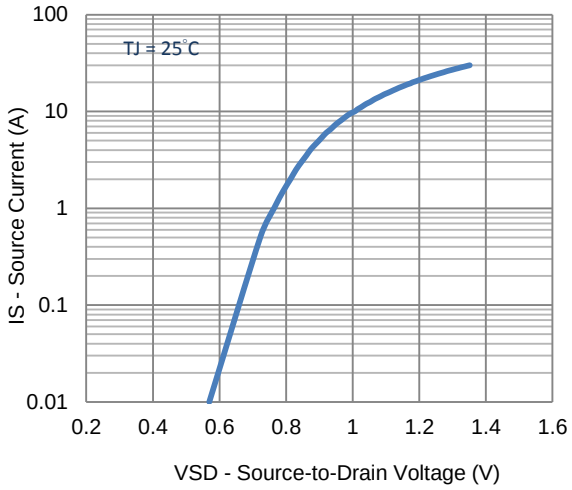
1. On-Resistance vs. Drain Current



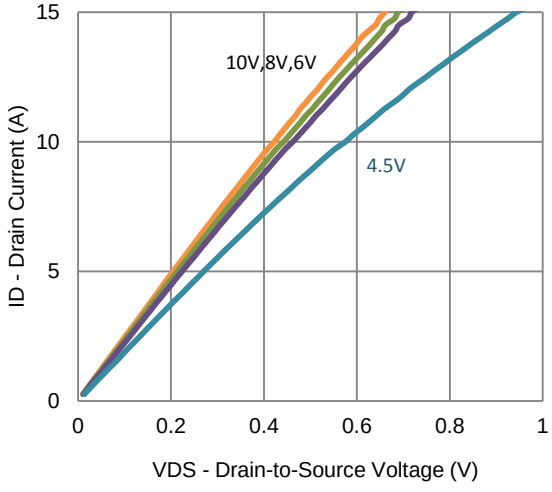
2. Transfer Characteristics



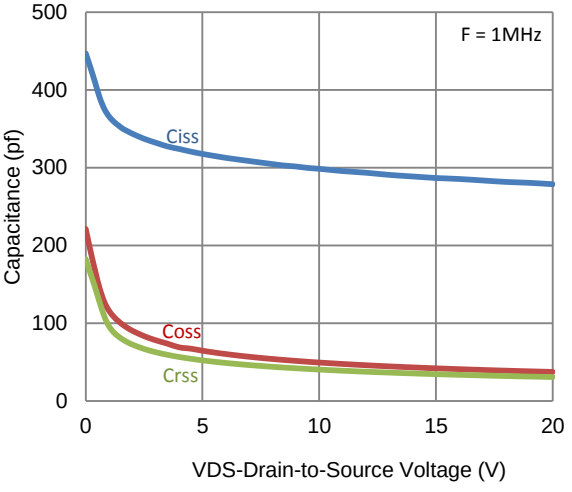
3. On-Resistance vs. Gate-to-Source Voltage



4. Drain-to-Source Forward Voltage

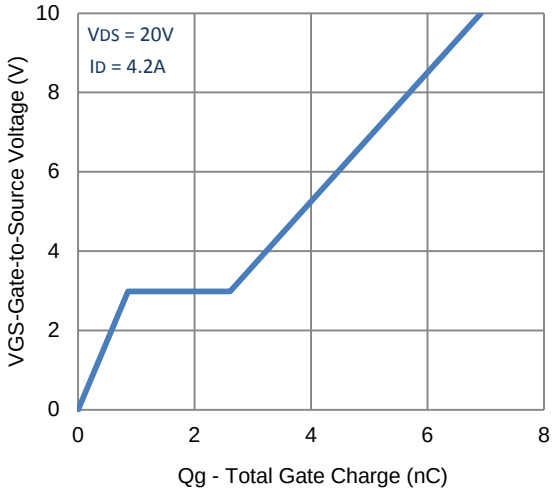


5. Output Characteristics

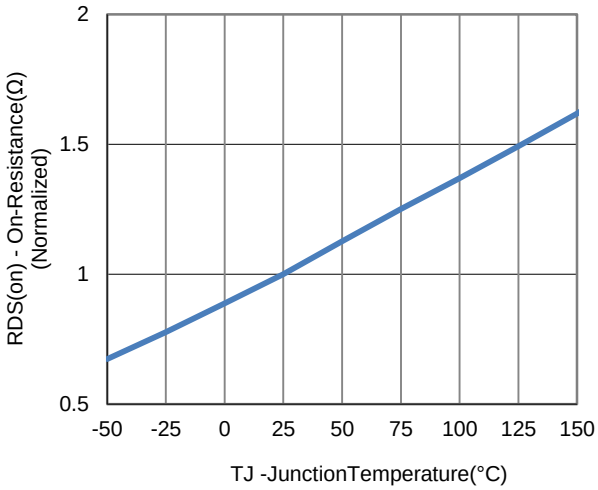


6. Capacitance

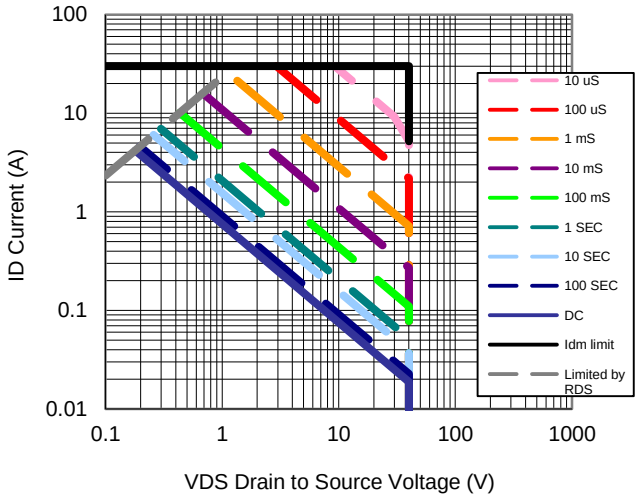
Typical Electrical Characteristics



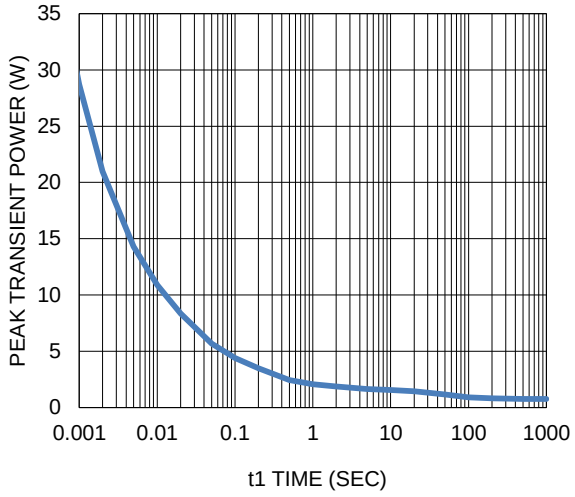
7. Gate Charge



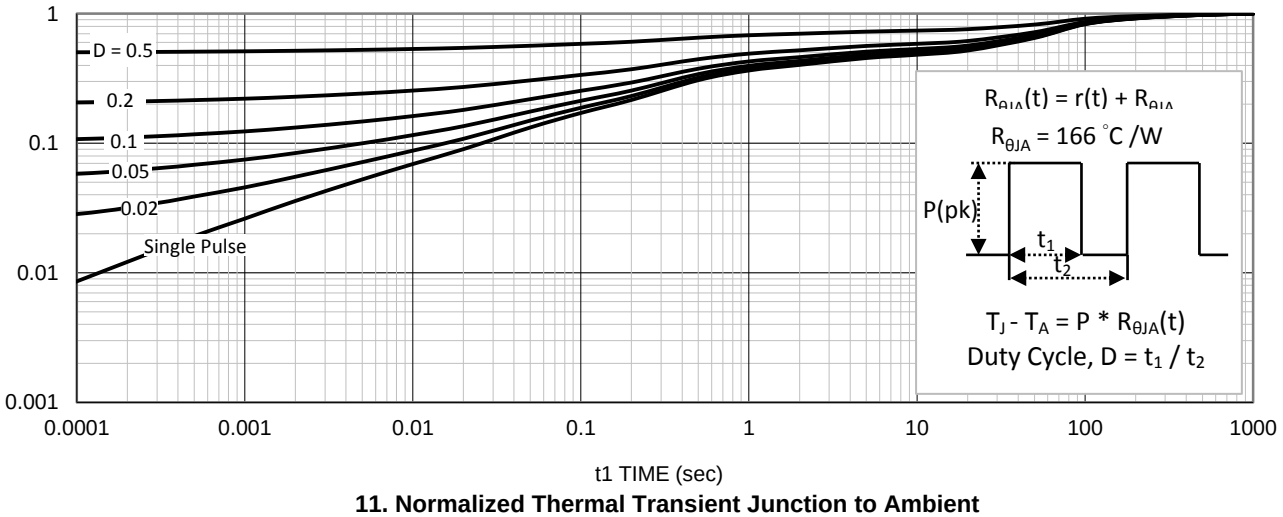
8. Normalized On-Resistance Vs Junction Temperature



9. Safe Operating Area

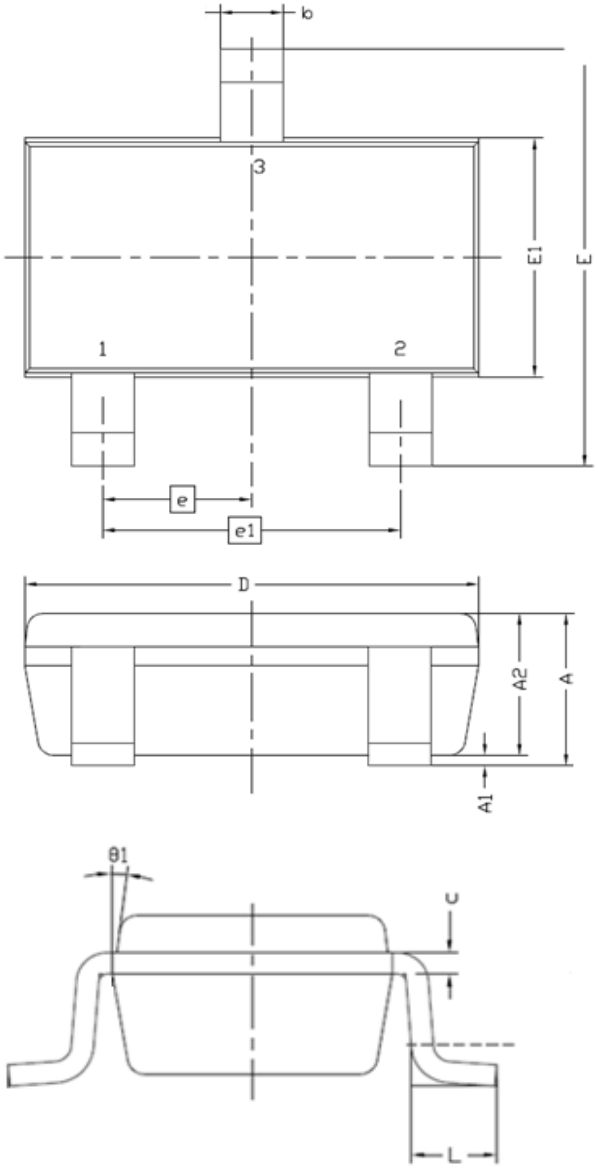


10. Single Pulse Maximum Power Dissipation



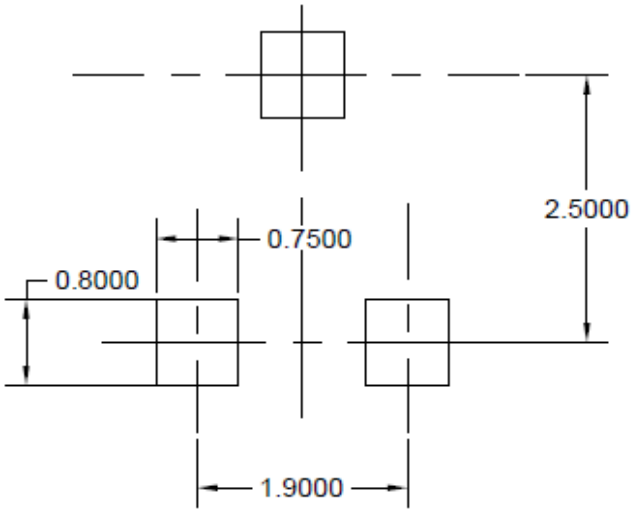
11. Normalized Thermal Transient Junction to Ambient

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