40V 0.9mΩ sTOLL N-Ch Power MOSFET

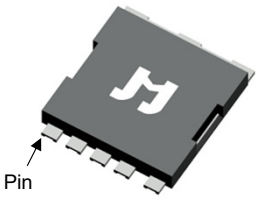
Features

- Ultra-low ON-resistance, $R_{DS(ON)}$
- Standard Level Threshold, $V_{GS(th)}$
- 100% UIS and R_g Tested
- Pb-free Lead Plating
- Halogen-free and RoHS-compliant
- AEC-Q101 Qualified for Automotive Applications

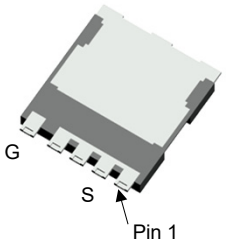
Product Summary

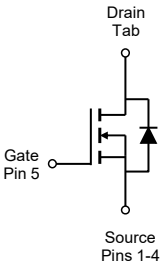
Parameter	Value	Unit
V_{DS}	40	V
$V_{GS(th)\_Typ}$	2.8	V
I_D (@ V_{GS} = 10V) (2)	352	A
$R_{DS(ON)\_Typ}$ (@ V_{GS} = 10V)	0.90	mΩ

PowerJE®7x8 Top View



PowerJE®7x8 Bottom View





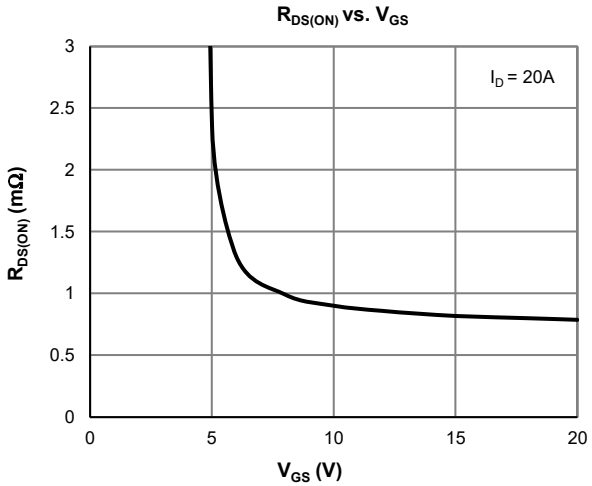
Ordering Information

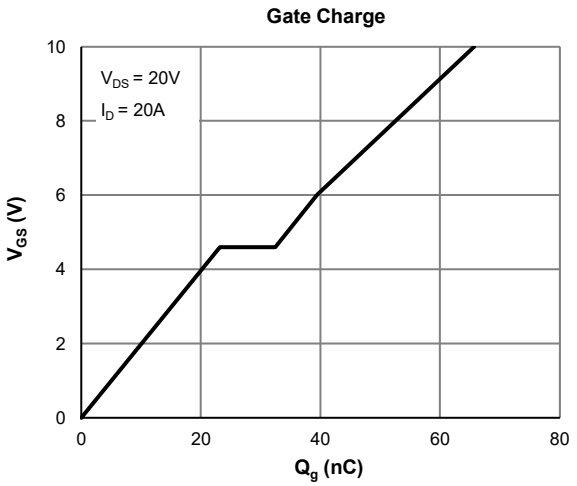
Device	Package	# of Pins	Marking	MSL	T_J (°C)	Media	Quantity (pcs)
JMSH0401ATSQ-13	PowerJE®7x8 (1)	5	SH0401AQ	3	-55 to 175	13-inch Reel	2000

Note 1: PowerJE® is a registered trademark of JieJie Micro., its package outline is compatible to that of s-TO-LeadLess (sTOLL).

Absolute Maximum Ratings (@ T_A = 25°C unless otherwise specified)

Parameter		Symbol	Value	Unit
Drain-to-Source Voltage		V_{DS}	40	V
Gate-to-Source Voltage		V_{GS}	±20	V
Continuous Drain Current	T_C = 25°C (2)	I_D	352	A
	T_C = 100°C (3)		238	
Pulsed Drain Current (4)		I_{DM}	931	A
Avalanche Current (5)		I_{AS}	42	A
Avalanche Energy (5)		E_{AS}	441	mJ
Power Dissipation (6)	T_C = 25°C	P_D	250	W
	T_C = 100°C		125	
Junction & Storage Temperature Range		T_J, T_{STG}	-55 to 175	°C





Electrical Characteristics (@ T_J = 25°C unless otherwise specified)

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
STATIC PARAMETERS						
Drain-Source Breakdown Voltage	$V_{(BR)DSS}$	I_D = 250μA, V_{GS} = 0V	40			V
Zero Gate Voltage Drain Current	I_{DSS}	V_{DS} = 32V, V_{GS} = 0V			1.0	μA
		T_J = 55°C			5.0	
Gate-Body Leakage Current	I_{GSS}	V_{DS} = 0V, V_{GS} = ±20V			±100	nA
Gate Threshold Voltage	$V_{GS(th)}$	V_{DS} = V_{GS}, I_D = 250μA	2.2	2.8	3.4	V
Static Drain-Source ON-Resistance	$R_{DS(ON)}$	V_{GS} = 10V, I_D = 20A		0.90	1.1	mΩ
Forward Transconductance	g_{FS}	V_{DS} = 5V, I_D = 20A		95		S
Diode Forward Voltage	V_{SD}	I_S = 1A, V_{GS} = 0V		0.68	1.0	V
Diode Continuous Current	I_S	T_C = 25°C			250	A
DYNAMIC PARAMETERS [7]						
Input Capacitance	C_{iss}	V_{GS} = 0V, V_{DS} = 20V, f = 1MHz		5214		pF
Output Capacitance	C_{oss}			3396		pF
Reverse Transfer Capacitance	C_{rss}			46		pF
Gate Resistance	R_g	V_{GS} = 0V, V_{DS}= 0V, f = 1MHz		1.9		Ω
SWITCHING PARAMETERS [7]						
Total Gate Charge (@ V_{GS} = 10V)	Q_g	V_{GS} = 0 to 10V V_{DS} = 20V, I_D = 20A		66		nC
Total Gate Charge (@ V_{GS} = 6.0V)	Q_g			40		nC
Gate Source Charge	Q_{gs}			23		nC
Gate Drain Charge	Q_{gd}			9.3		nC
Turn-On DelayTime	$t_{D(on)}$	V_{GS} = 10V, V_{DS} = 20V R_L = 1.0Ω, R_{GEN} = 3Ω		20		ns
Turn-On Rise Time	t_r			17.2		ns
Turn-Off DelayTime	$t_{D(off)}$			43		ns
Turn-Off Fall Time	t_f			16.1		ns
Body Diode Reverse Recovery Time	t_{rr}	I_F = 20A, dI_F/dt = 100A/μs		68		ns
Body Diode Reverse Recovery Charge	Q_{rr}	I_F = 20A, dI_F/dt = 100A/μs		78		nC

Thermal Performance

Parameter	Symbol	Typ.	Max.	Unit
Thermal Resistance, Junction-to-Ambient	$R_{\theta JA}$	42	50	°C/W
Thermal Resistance, Junction-to-Case	$R_{\theta JC}$	0.60	0.70	°C/W

Notes:

2. Continuous current rating is limited by the package used; and the chip current is able to carry 330A while $R_{\theta JC} \leqslant 0.70$°C/W.
3. This value is verified by characterization hence it is not included in the production test.
4. This single-pulse measurement was taken under T_{J_Max} = 175°C.
5. This single-pulse measurement was taken under the following condition [L = 500μH, V_{GS} = 10V, V_{DD} = 20V] while its value is limited by T_{J_Max} = 175°C.
6. The power dissipation P_D is based on T_{J_Max} = 175°C.
7. This value is guaranteed by design hence it is not included in the production test.

Typical Electrical & Thermal Characteristics

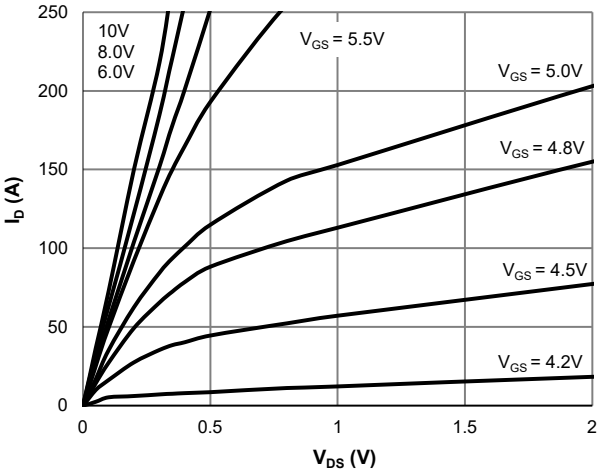


Figure 1: Saturation Characteristics

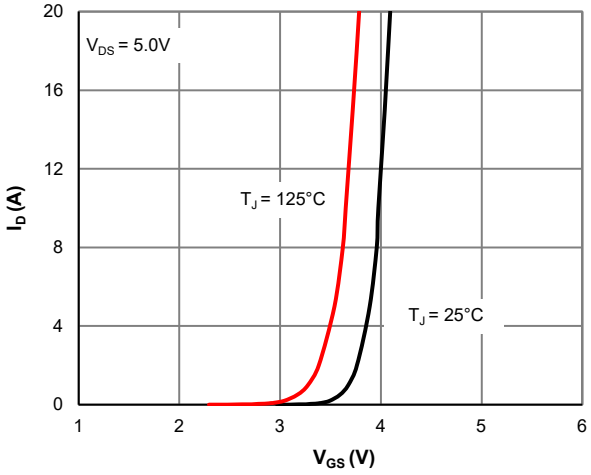


Figure 2: Transfer Characteristics

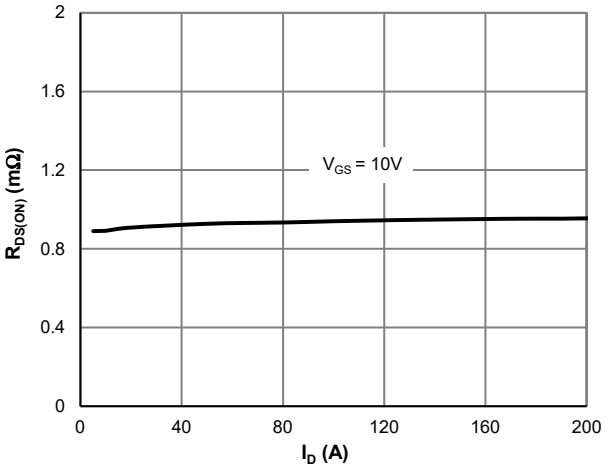


Figure 3: $R_{DS(ON)}$ vs. Drain Current

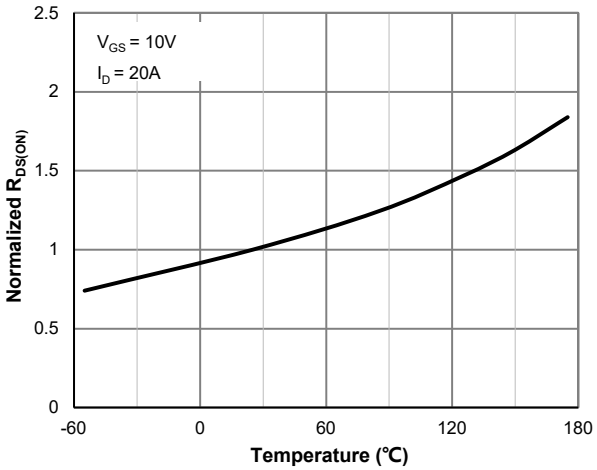


Figure 4: $R_{DS(ON)}$ vs. Junction Temperature

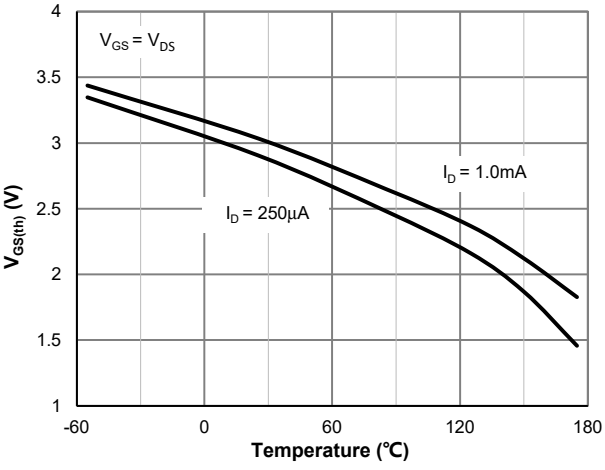


Figure 5: $V_{GS(th)}$ vs. Junction Temperature

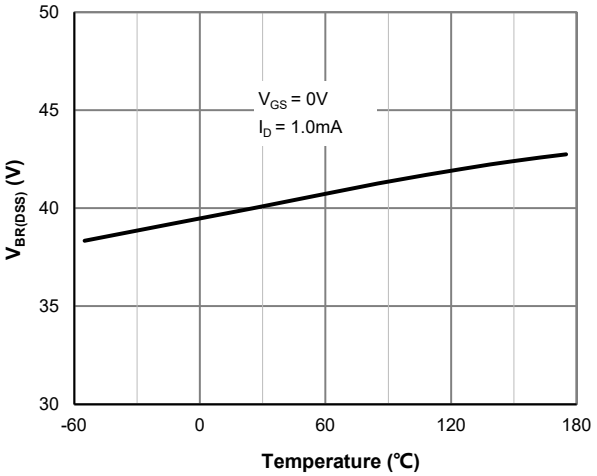


Figure 6: $V_{BR(DSS)}$ vs. Junction Temperature

Typical Electrical & Thermal Characteristics

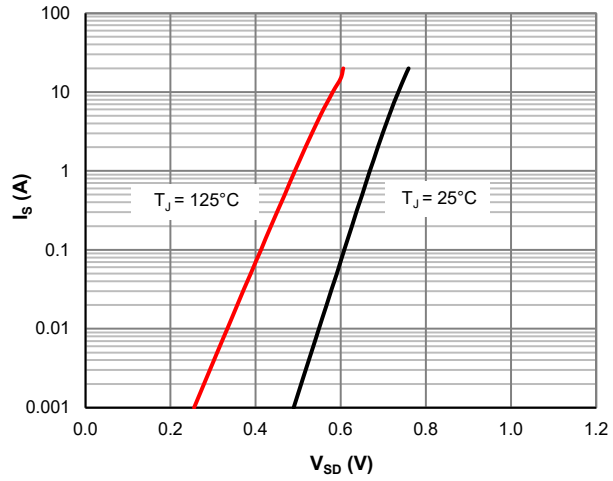


Figure 7: Body-Diode Characteristics

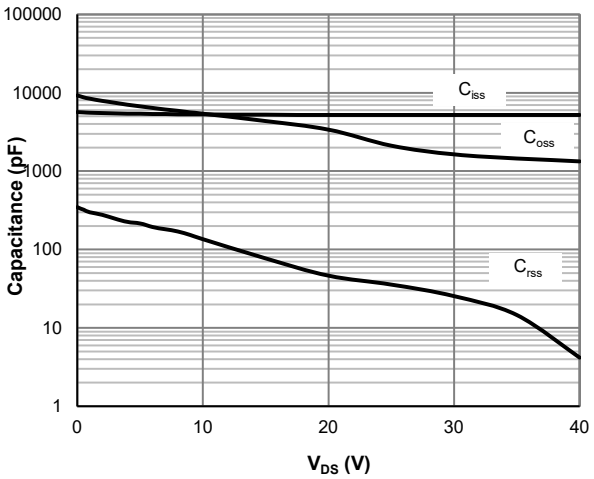


Figure 8: Capacitance Characteristics

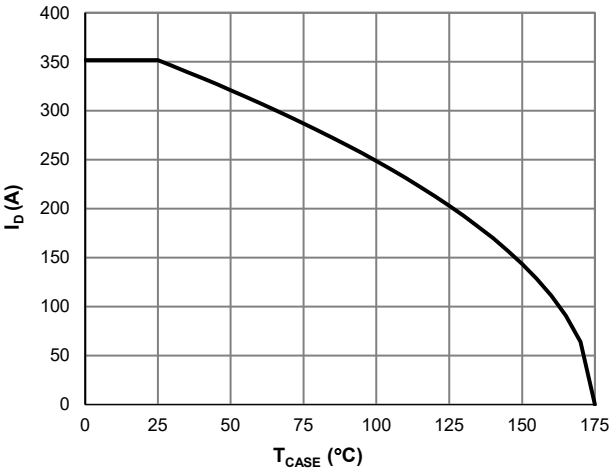


Figure 9: Current De-rating

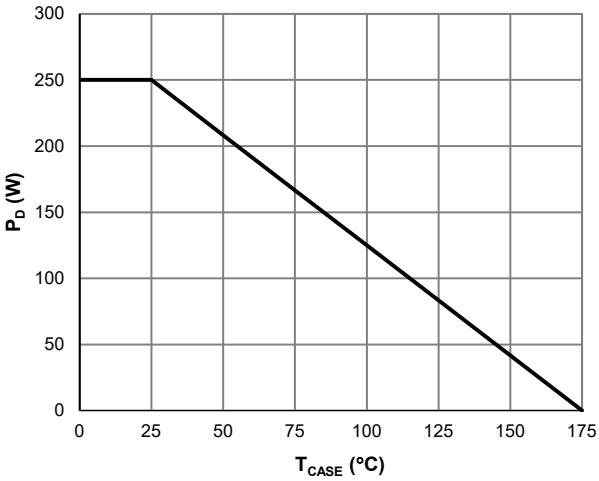


Figure 10: Power De-rating

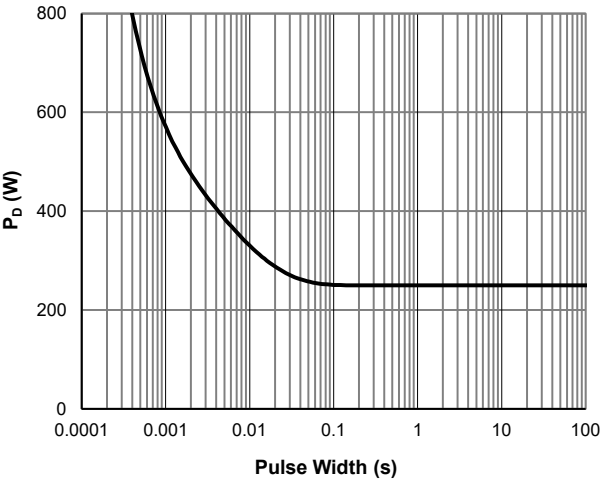


Figure 11: Single Pulse Power Rating, Junction-to-Case

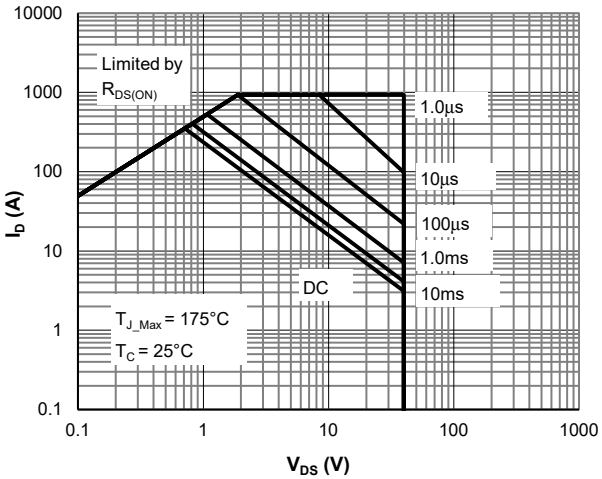


Figure 12: Maximum Safe Operating Area

Typical Electrical & Thermal Characteristics

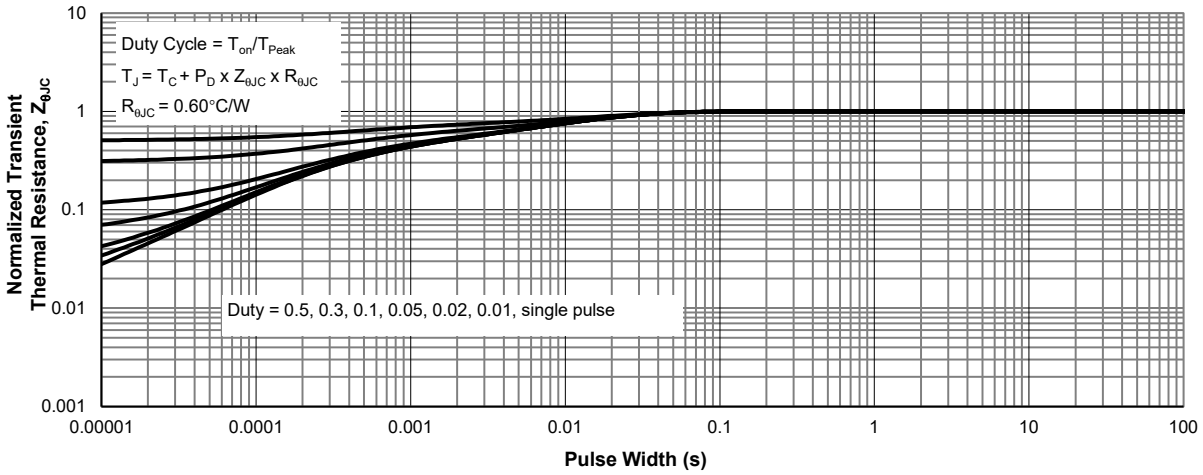
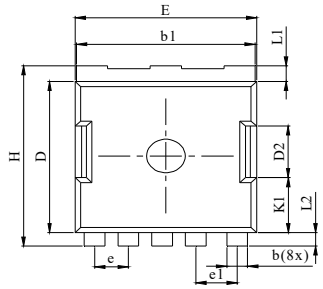


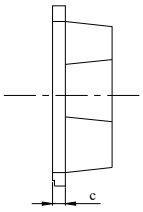
Figure 13: Normalized Maximum Transient Thermal Impedance

PowerJE®7x8 Package Information

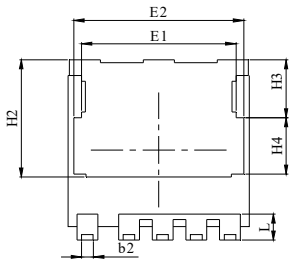
Package Outlines



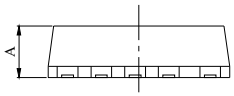
Top View



Side View



Bottom View



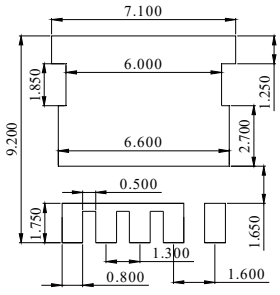
Front View

NOTES:

1. Dimension and tolerance per ASME Y14.5M, 1994.
2. All dimensions in millimeter.
3. Dimensions do not include burrs or mold flash.

DIM.	MILLIMETER		
	MIN.	NOM.	MAX.
A	2.20	2.30	2.40
b	0.70	0.80	0.90
b1	6.80	6.90	7.00
b2	0.40	0.45	0.50
c	0.40	0.50	0.60
D	6.50	6.70	6.90
D2	2.30 (REF)		
E	6.80	7.00	7.20
E1	5.96 (REF)		
E2	6.56 (REF)		
e	1.30 (BSC)		
e1	1.60 (BSC)		
H	7.80	8.00	8.20
H2	5.20 (REF)		
H3	2.57 (REF)		
H4	2.50 (REF)		
K1	2.43 (REF)		
L	1.05	1.15	1.25
L1	0.70		
L2	0.60		

Recommended Soldering Footprint



DIMENSIONS:MILLIMETERS