JMSH0402AEQ

40V 1.3mΩ N-Ch Power MOSFET

Product Summary

Parameter	Typ.	Unit
V_{DS}	40	V
$V_{GS(th)}$	2.8	V
I_D (@ V_{GS} = 10V) (1)	253	A
$R_{DS(ON)}$ (@ V_{GS} = 10V)	1.3	mΩ

Ordering Information

Device	Package	# of Pins	Marking	MSL	T_J (°C)	Media	Quantity (pcs)
JMSH0402AEQ-13	TO-263-3L	3	SH0402AQ	1	-55 to 175	13-inch Reel	800

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 (1)	T_C = 25°C	I_D	253	A
	T_C = 100°C		179	
Pulsed Drain Current (2)		I_{DM}	775	A
Avalanche Energy (3)		E_{AS}	726	mJ
Power Dissipation (4)	T_C = 25°C	P_D	230	W
	T_C = 100°C		115	
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
		V_{DS} = 32V, V_{GS} = 0V			1.0	μA
		T_J = 55°C			5.0	
	I_{GSS}				±100	nA
Gate Threshold Voltage	$V_{GS(th)}$		2.2	2.8	3.4	V
Static Drain-Source ON-Resistance	$R_{DS(ON)}$			1.3	1.7	mΩ
Forward Transconductance	g_{FS}	V_{DS} = 5V, I_D = 20A		93		S
Diode Forward Voltage	V_{SD}	I_S = 1A, V_{GS} = 0V		0.70	1.0	V
	I_S	T_C = 25°C			230	A
DYNAMIC PARAMETERS (5)						
Input Capacitance	C_{iss}			5280		pF
Output Capacitance	C_{oss}	V_{GS} = 0V, V_{DS} = 20V, f = 1MHz		3405		pF
Reverse Transfer Capacitance	C_{rss}			71		pF
Gate Resistance	R_g	V_{GS} = 0V, V_{DS}= 0V, f = 1MHz		1.9		Ω
SWITCHING PARAMETERS (5)						
Total Gate Charge (@ V_{GS} = 10V)	Q_g			68		nC
Total Gate Charge (@ V_{GS} = 6.0V)	Q_g	V_{GS} = 0 to 10V		43		nC
Gate Source Charge	Q_{gs}	V_{DS} = 20V, I_D = 20A		21		nC
Gate Drain Charge	Q_{gd}			13.4		nC
Turn-On DelayTime	$t_{D(on)}$			17.4		ns
Turn-On Rise Time	t_r	V_{GS} = 10V, V_{DS} = 20V		33		ns
Turn-Off DelayTime	$t_{D(off)}$	R_L = 1.0Ω, R_{GEN} = 3Ω		47		ns
Turn-Off Fall Time	t_f			17.8		ns
	t_{rr}			74		ns
Body Diode Reverse Recovery Charge	Q_{rr}	I_F = 20A, dI_F/dt = 100A/μs		63		nC

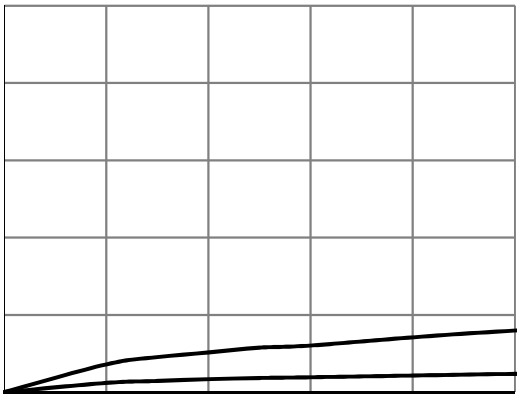
Thermal Performance

Parameter	Symbol	Typ.	Max.	Unit
Thermal Resistance, Junction-to-Ambient	$R_{\theta JA}$	45	50	°C/W
Thermal Resistance, Junction-to-Case	$R_{\theta JC}$	0.65	0.75	°C/W

Notes:

1. Computed continuous current assumes the condition of T_{J_Max} while the actual continuous current depends on the thermal & electro-mechanical application board design.
2. This single-pulse measurement was taken under T_{J_Max} = 175°C.
3. E_{AS} of 726 mJ is based on starting T_J = 25°C,L = 3.0mH, I_{AS} = 22A, V_{GS} = 10V, V_{DD} = 20V;100% test at L = 0.3mH, I_{AS} = 46A.
4. The power dissipation P_D is based on T_{J_Max} = 175°C.
5. This value is guaranteed by design hence it is not included in the production test.

Typical Electrical & Thermal Characteristics



Typical Electrical & Thermal Characteristics

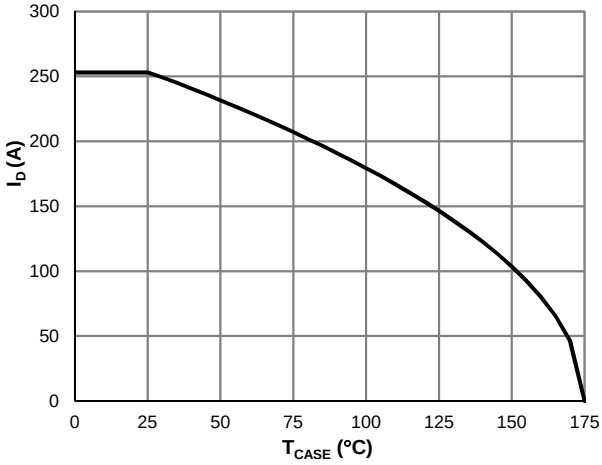


Figure 9: Current De-rating

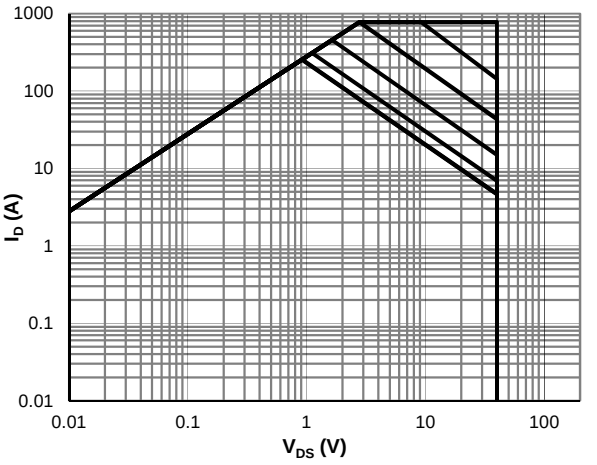
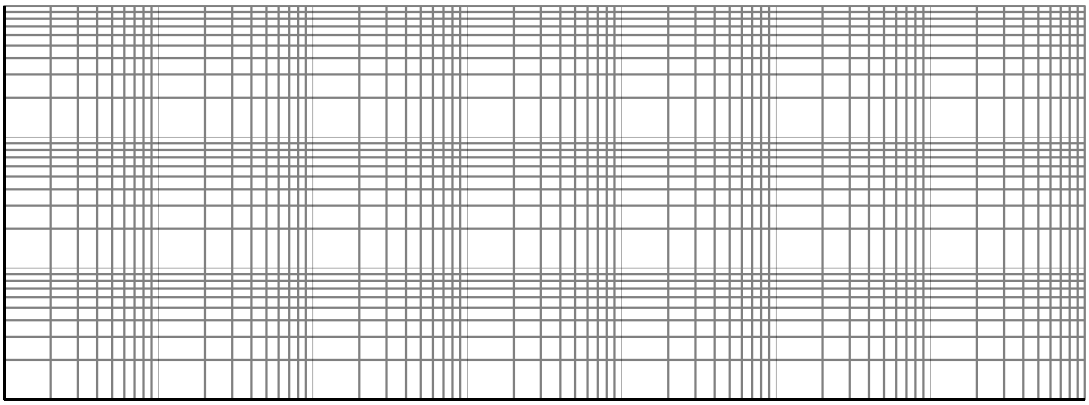


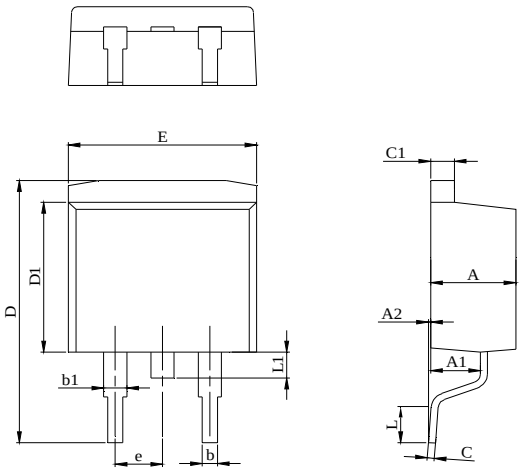
Figure 11: Maximum Safe Operating Area

Typical Electrical & Thermal Characteristics



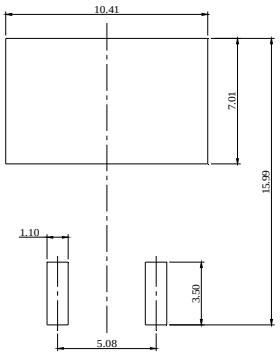
TO-263-3L Package Information

Package Outline



DIM.	MILLIMETER		
	MIN.	NOM.	MAX.
A	4.24		4.77
A1	2.30		2.89
A2	0.00	0.10	0.25
b	0.70		0.96
b1	1.17		1.70
C	0.30		0.60
C1	1.15		1.42

Recommend Soldering Footprint



DIMENSIONS: MILLIMETERS