

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⁾	I _D	253	A
Current ⁽¹⁾		179	
Pulsed Drain Current ⁽²⁾	I _{DM}	775	A
Avalanche Energy ⁽³⁾	E _{AS}	726	mJ
Power Dissipation ⁽⁴⁾	P _D	230	W
		115	
Junction & Storage Temperature Range	T _J , T _{STG}	-55 to 175	°C

Electrical Characteristics (@ $T_J = 25^\circ\text{C}$ unless otherwise specified)

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
STATIC PARAMETERS						
Drain-Source Breakdown Voltage	$V_{(BR)DSS}$	$I_D = 250\mu\text{A}$, $V_{GS} = 0\text{V}$ $V_{DS} = 32\text{V}$, $V_{GS} = 0\text{V}$ $T_J = 55^\circ\text{C}$	40		1.0 5.0	V μA
	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	m Ω
Forward Transconductance	g_{FS}	$V_{DS} = 5\text{V}$, $I_D = 20\text{A}$		93		S
Diode Forward Voltage	V_{SD}	$I_S = 1\text{A}$, $V_{GS} = 0\text{V}$ $T_C = 25^\circ\text{C}$		0.70	1.0	V
	I_S				230	A
DYNAMIC PARAMETERS ⁽⁵⁾						
Input Capacitance	C_{iss}			5280		pF
Output Capacitance	C_{oss}	$V_{GS} = 0\text{V}$, $V_{DS} = 20\text{V}$, $f = 1\text{MHz}$		3405		pF
Reverse Transfer Capacitance	C_{rss}			71		pF
Gate Resistance	R_g	$V_{GS} = 0\text{V}$, $V_{DS} = 0\text{V}$, $f = 1\text{MHz}$		1.9		Ω
SWITCHING PARAMETERS ⁽⁵⁾						
Total Gate Charge (@ $V_{GS} = 10\text{V}$)	Q_g			68		nC
Total Gate Charge (@ $V_{GS} = 6.0\text{V}$)	Q_g	$V_{GS} = 0$ to 10V		43		nC
Gate Source Charge	Q_{gs}	$V_{DS} = 20\text{V}$, $I_D = 20\text{A}$		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	$V_{GS} = 10\text{V}$, $V_{DS} = 20\text{V}$		33		ns
Turn-Off DelayTime	$t_{D(off)}$	$R_L = 1.0\Omega$, $R_{GEN} = 3\Omega$		47		ns
Turn-Off Fall Time	t_f			17.8		ns
	t_{rr}			74		ns
Body Diode Reverse Recovery Charge	Q_{rr}	$I_F = 20\text{A}$, $dI_F/dt = 100\text{A}/\mu\text{s}$		63		nC

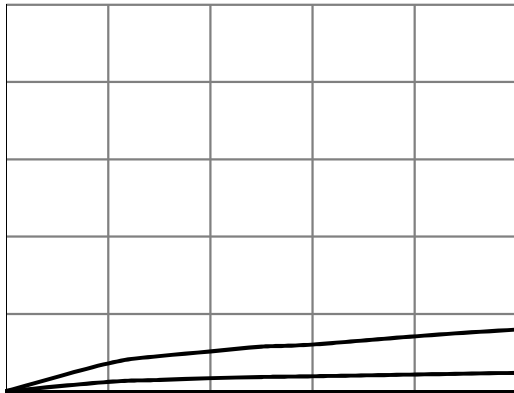
Thermal Performance

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

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 $T_{J_Max} = 175^\circ\text{C}$.
3. E_{AS} of 726 mJ is based on starting $T_J = 25^\circ\text{C}$, $L = 3.0\text{mH}$, $I_{AS} = 22\text{A}$, $V_{GS} = 10\text{V}$, $V_{DD} = 20\text{V}$; 100% test at $L = 0.3\text{mH}$, $I_{AS} = 46\text{A}$.
4. The power dissipation P_D is based on $T_{J_Max} = 175^\circ\text{C}$.
5. This value is guaranteed by design hence it is not included in the production test.

Typical Electrical & Thermal Characteristics





Typical Electrical & Thermal Characteristics

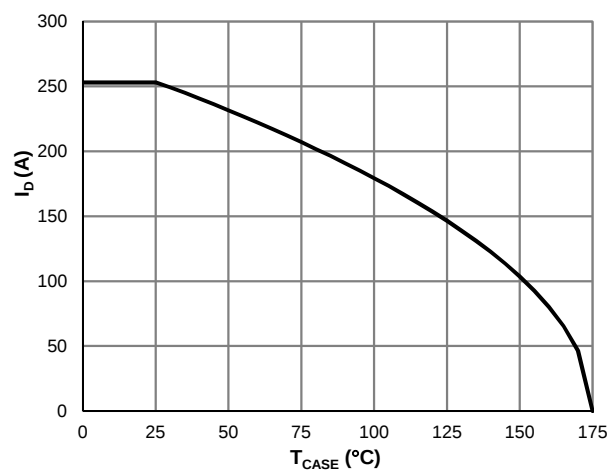


Figure 9: Current De-rating

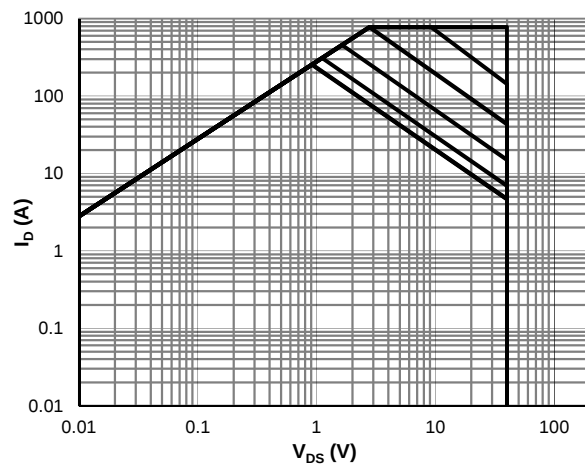
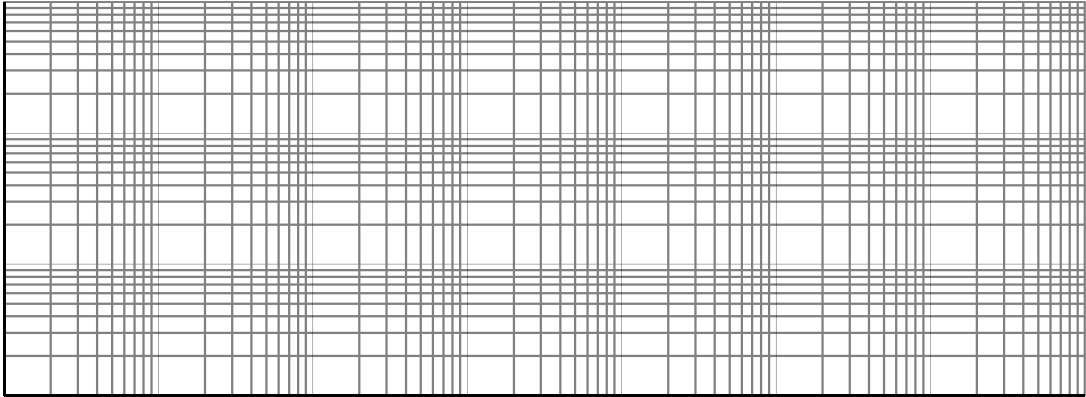


Figure 11: Maximum Safe Operating Area



JMSH0402AEQ

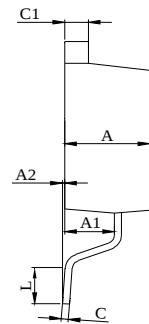
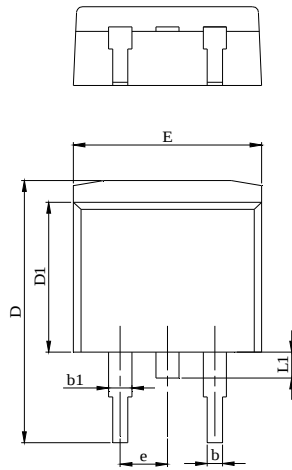
Typical Electrical & Thermal Characteristics





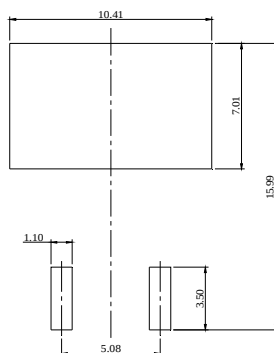
TO-263-3L Package Information

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