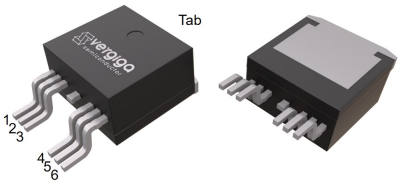
V_{DS}	40	V
$R_{DS(on),TYP}$@ V_{GS}=10 V	1.1	mΩ
$R_{DS(on),TYP}$@ V_{GS}=4.5 V	1.5	mΩ
$I_{D(Package\ Limited)}$	175	A

Features

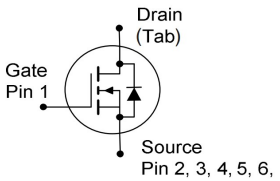
- Enhancement mode
- Very low on-resistance
- Fast Switching and High efficiency
- 100% Avalanche Tested

TO-263-6L



Pb-Free RoHS HF Halogen-Free

Part ID	Package Type	Marking	Packing
VS4603DM6	TO-263-6L	4603DM	800pcs/Reel



Maximum ratings, at T_A=25 °C, unless otherwise specified

Symbol	Parameter		Rating	Unit
$V_{(BR)DSS}$	Drain-Source breakdown voltage		40	V
V_{GS}	Gate-Source voltage		±20	V
I_S	Diode continuous forward current (Wire bond limited)	T_C = 25°C	175	A
I_D	Continuous drain current @V_{GS}=10V (Wire bond limited)	T_C = 25°C	175	A
I_D	Continuous drain current @V_{GS}=10V (Wire bond limited)	T_C = 100°C	175	A
I_{DM}	Pulse drain current tested ①	T_C = 25°C	1100	A
I_{DSM}	Continuous drain current @VGS=10V	T_A = 25°C	33	A
		T_A = 70°C	26	A
EAS	Avalanche energy, single pulsed ②		506	mJ
P_D	Maximum power dissipation	T_C = 25°C	300	W
P_{DSM}	Maximum power dissipation ③	T_A = 25°C	2	W
T_{STG},T_J	Storage and Junction Temperature Range		-55 to 175	°C

Thermal Characteristics

Symbol	Parameter	Typical	Max	Unit
$R_{\theta JC}$	Thermal Resistance, Junction-to-Case	0.5	1	°C/W
$R_{\theta JA}$	Thermal Resistance, Junction-to-Ambient	62.5	75	°C/W

Electrical Characteristics

Symbol	Parameter	Condition	Min.	Typ.	Max.	Unit
Static Electrical Characteristics @ T_j = 25°C (unless otherwise stated)						
$V_{(BR)DSS}$	Drain-Source Breakdown Voltage	V_{GS}=0V, I_D=250μA	40	--	--	V
I_{DSS}	Zero Gate Voltage Drain Current(T_j=25℃)	V_{DS}=40V,V_{GS}=0V	--	--	1	μA
	Zero Gate Voltage Drain Current(T_j=125℃)	V_{DS}=40V,V_{GS}=0V	--	--	100	μA
I_{GSS}	Gate-Body Leakage Current	V_{GS}=±20V,V_{DS}=0V	--	--	±100	nA
$V_{GS(th)}$	Gate Threshold Voltage	V_{DS}=V_{GS},I_D=250μA	1.3	1.8	2.4	V
$R_{DS(on)}$	Drain-Source On-State Resistance ④	V_{GS}=10V, I_D=60A	--	1.1	1.4	mΩ
		(T_j=100℃)	--	1.4	--	mΩ
$R_{DS(on)}$	Drain-Source On-State Resistance ④	V_{GS}=4.5V, I_D=40A	--	1.5	2	mΩ
Dynamic Electrical Characteristics @ T_j= 25°C (unless otherwise stated)						
Ciss	Input Capacitance	V_{DS}=20V,V_{GS}=0V, f=1MHz	11410	15210	20230	pF
Coss	Output Capacitance		930	1245	1655	pF
Crss	Reverse Transfer Capacitance		580	770	1025	pF
Rg	Gate Resistance	f=1MHz	0.2	0.5	3	Ω
Qg(10V)	Total Gate Charge	V_{DS}=20V,I_D=60A, V_{GS}=10V	--	204	271	nC
Qg(4.5V)	Total Gate Charge		--	97	129	nC
Qgs	Gate-Source Charge		--	45	60	nC
Qgd	Gate-Drain Charge		--	38	57	nC
Switching Characteristics						
Td(on)	Turn-on Delay Time	V_{DD}=20V, I_D=60A, R_G=3Ω, V_{GS}=10V	--	26	--	ns
Tr	Turn-on Rise Time		--	115	--	ns
Td(off)	Turn-Off Delay Time		--	102	--	ns
Tf	Turn-Off Fall Time		--	62	--	ns
Source- Drain Diode Characteristics@ T_j = 25°C (unless otherwise stated)						
V_{SD}	Forward on voltage	I_{SD}=40A,V_{GS}=0V	--	0.8	1.2	V
Trr	Reverse Recovery Time	I_{sd}=60A, V_{GS}=0V di/dt=100A/μs	--	31	62	ns
Qrr	Reverse Recovery Charge		--	28	56	nC

NOTE:

① Single pulse; pulse width ≤ 100μs.

② Limited by T_{Jmax}, starting T_J = 25°C, L = 0.5mH, R_G = 25Ω, I_{AS} = 45A, V_{GS} =10V. Part not recommended for use above this value

③ The power dissipation P_{DSM} is based on $R_{\theta JA}$ and the maximum allowed junction temperature of 150°C.

④ Pulse width ≤ 380μs; duty cycle≤ 2%.

Typical Characteristics

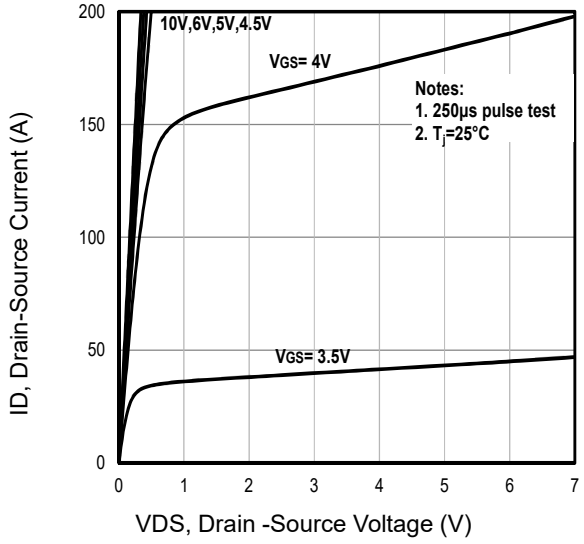


Fig1. Typical Output Characteristics

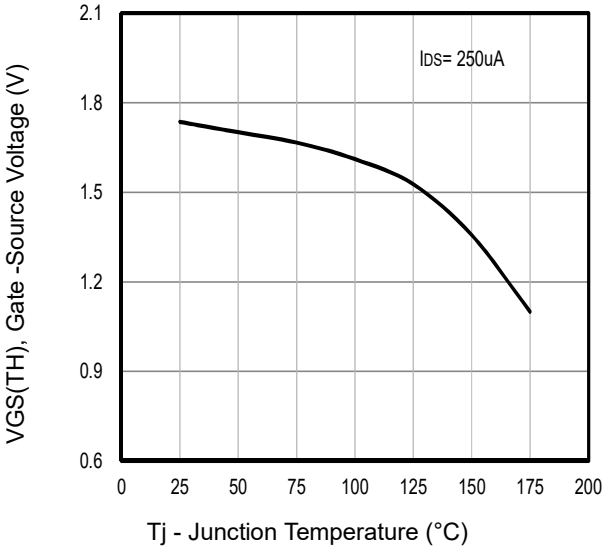


Fig2. $V_{GS(TH)}$ Gate -Source Voltage Vs. Tj

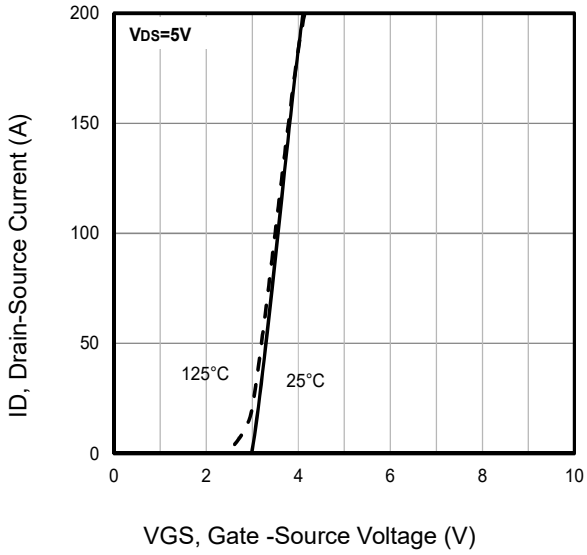


Fig3. Typical Transfer Characteristics

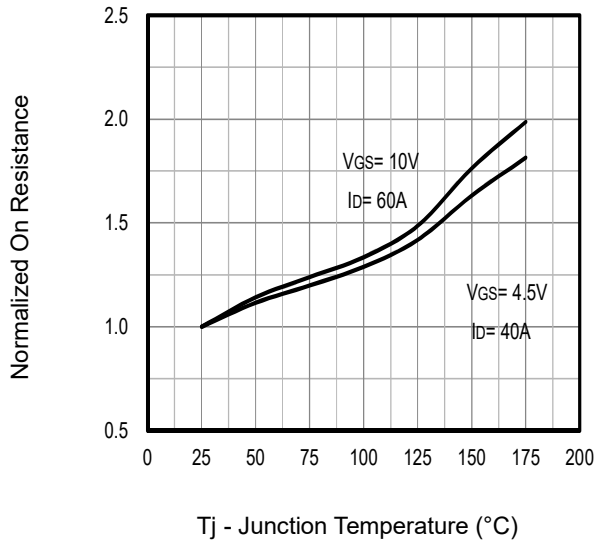


Fig4. Normalized On-Resistance Vs. Tj

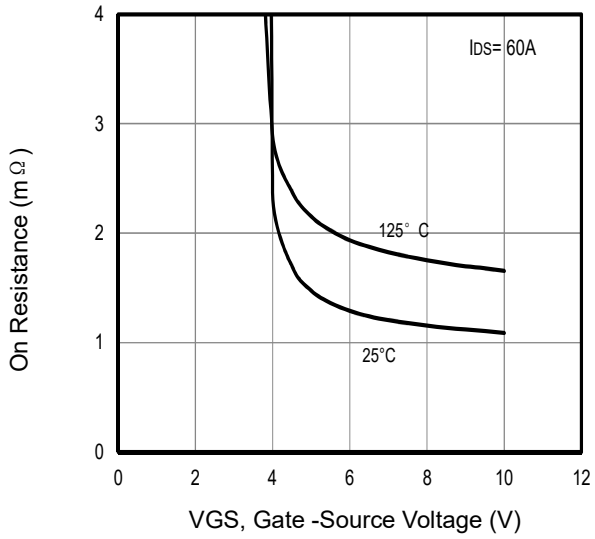


Fig5. On Resistance Vs Gate -Source Voltage

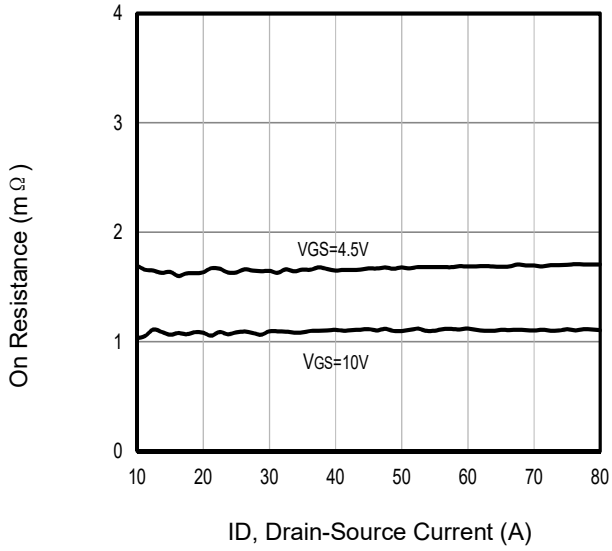


Fig6. On Resistance Vs Drain Current and Gate Voltage

Typical Characteristics

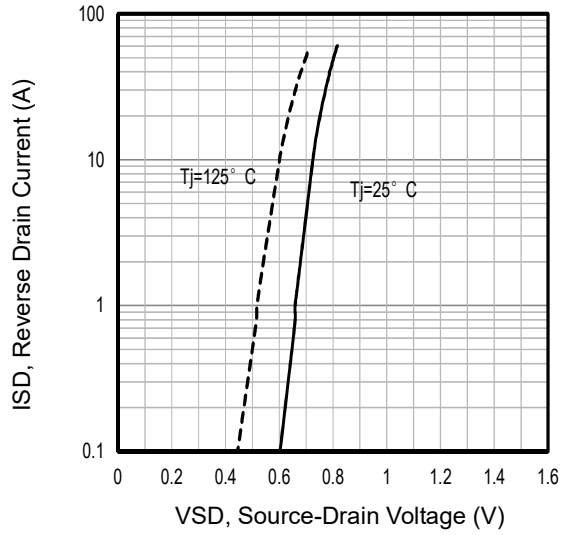


Fig7. Typical Source-Drain Diode Forward Voltage

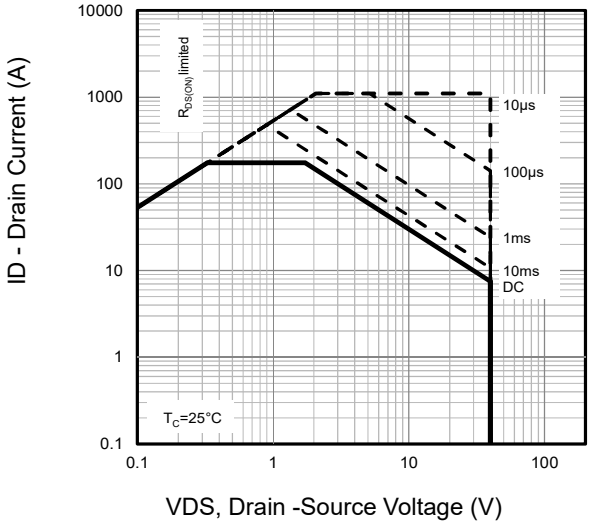


Fig8. Maximum Safe Operating Area

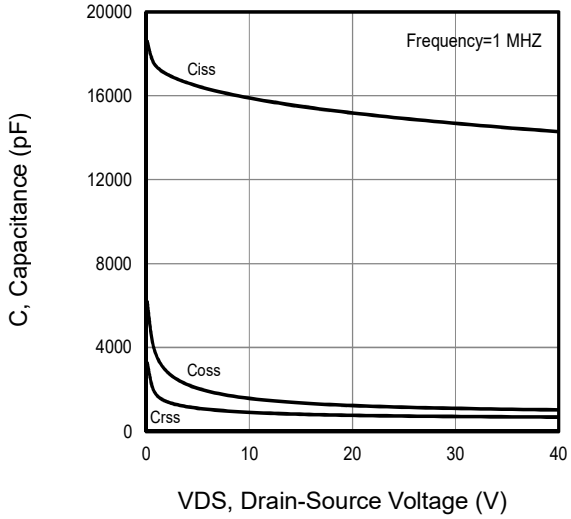


Fig9. Typical Capacitance Vs. Drain-Source Voltage

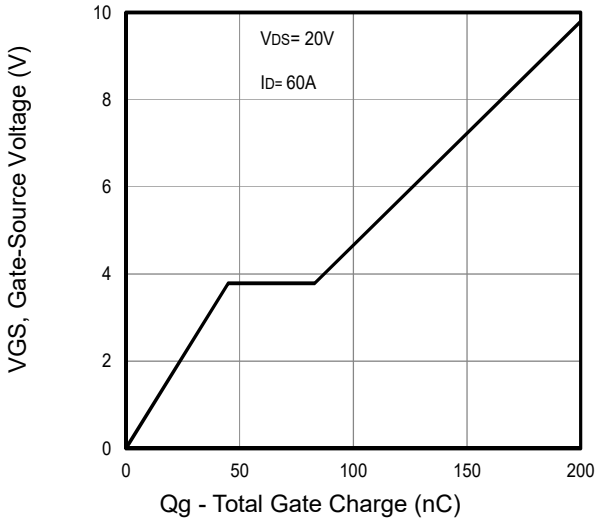


Fig10. Typical Gate Charge Vs. Gate-Source Voltage

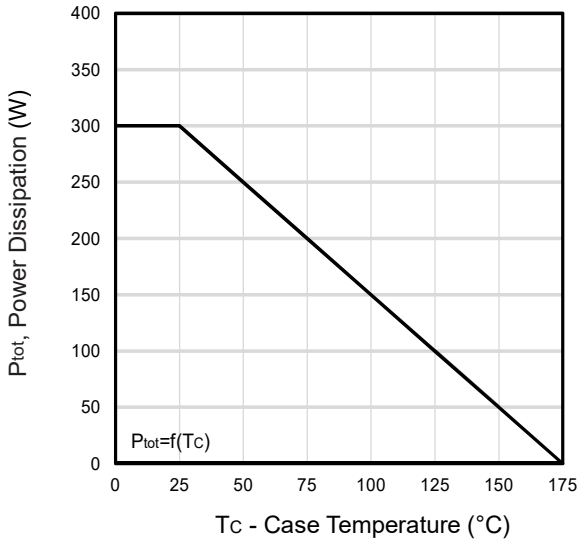


Fig11. Power Dissipation Vs. Case Temperature

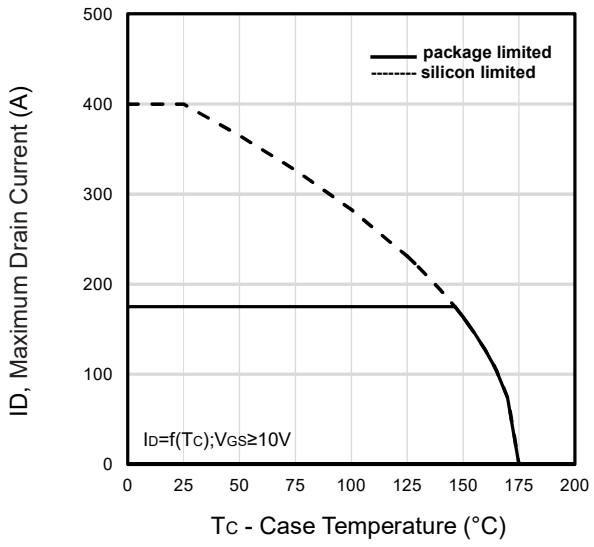


Fig12. Maximum Drain Current Vs. Case Temperature

Typical Characteristics

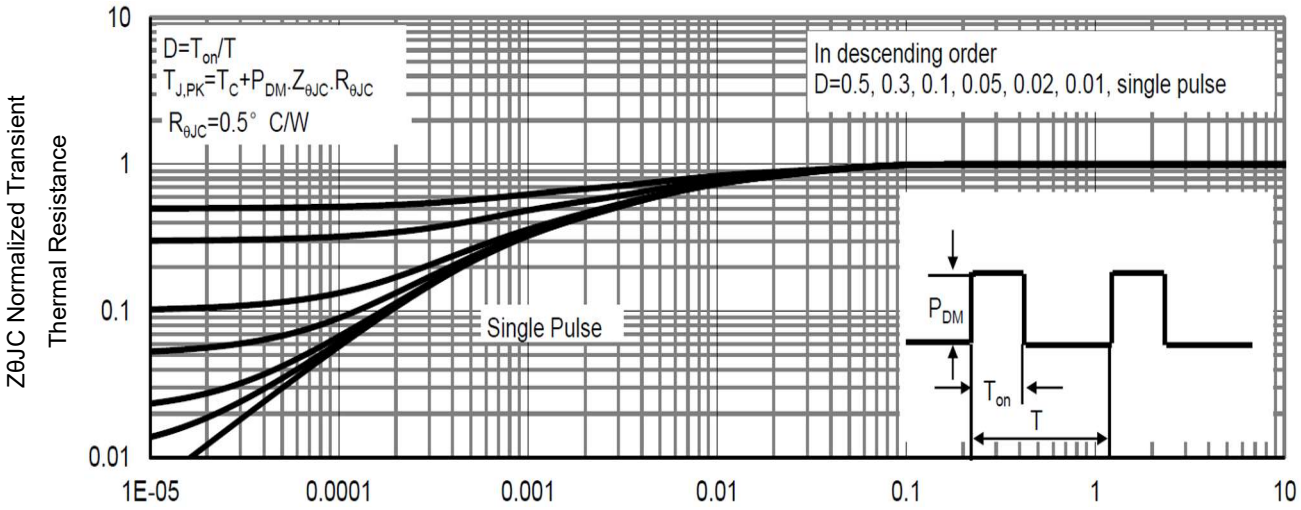


Fig11 . Normalized Maximum Transient Thermal Impedance

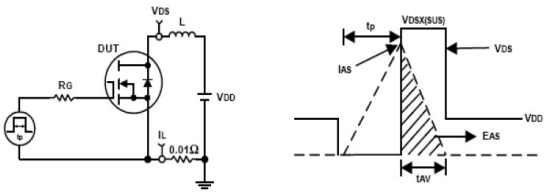


Fig12. Unclamped Inductive Test Circuit and waveforms

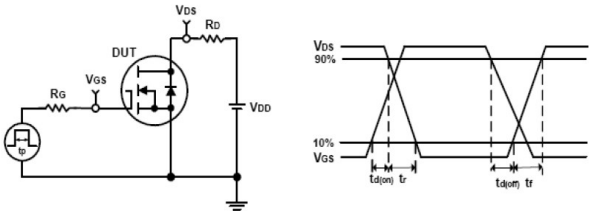
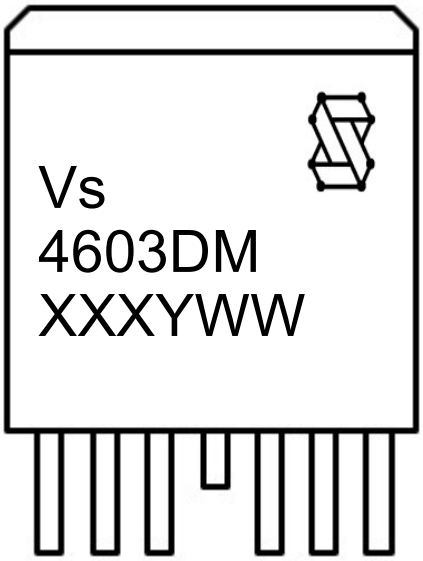


Fig13. Switching Time Test Circuit and waveforms

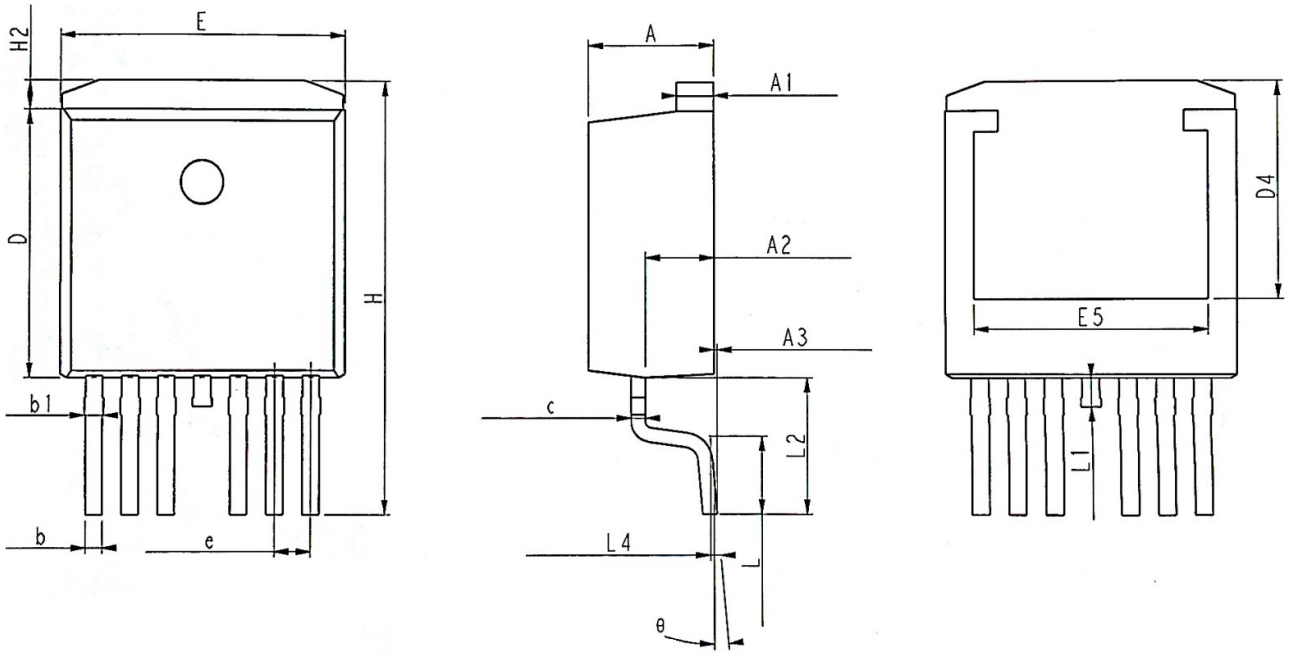
Marking Information



1st line: Vergiga Code（Vs）， Vergiga Logo
2nd line: Part Number（4603DM）
3rd line: Date code （XXXYWW）
XXX: Wafer Lot Number Code , code changed with Lot Number
Y: Year Code ， refer to table below
WW: Week Code (01 to 53)

Code	C	D	E	F	G	H	J	K	L	M	N	P	Q	R	S	T
Year	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030

TO-263-6L Package Outline Data



Symbol	Dimensions (unit: mm)		
	Min	Typ	Max
A	4.25	4.40	4.55
A1	1.20	1.30	1.40
A2	2.25	2.40	2.55
A3	0.01	0.13	0.25
b	0.50	0.60	0.70
b1	0.58	0.68	0.84
c	0.40	0.50	0.60
D	9.05	9.25	9.45
D4	6.90		
e	1.27 BSC		
E	9.80	10.00	10.20
E5	7.25		
H	14.65	15.00	15.35
H2	0.80	1.00	1.20
L1	0.85	1.00	1.15
L2	4.20	4.70	5.20
L4	0.25 BSC		
θ	2 °	5 °	8 °

Notes:

1. Dimension "D" & "E" do NOT include mold flash, mold flash shall not exceed 0.127mm per side.

Customer Service

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