

32 款车规级 40~150V N-沟道 JSFET® 广泛应用于汽车市场

32 Auto-grade 40~150V N-ch JSFET® Increasingly Found Homes in Automobiles



随着汽车智能化及辅助驾驶 (ADAS) 的普及, 激发了对电子元器件的巨大增量需求; 电动化和车联网趋势, 使越来越多传统机械元件被更可靠更灵敏的半导体器件取代。捷捷微电顺势而为, 二十六年如一日的聚焦功率半导体, 在人才建设、技术创新、生产制造和质量管理等方面积累了深厚的底蕴, 在汽车产品及市场应用持续耕耘多年, 以做好国产化替代为使命, 持续为车企及Tier-1客户提供更多的产品选择和更好的服务。

Proliferation of autonomous driving, ADAS, electrification, V2x result in the legacy components increasingly replaced by power semiconductors like JSFET. For the past 26 years, JJM has been investing heavily on people, systems, state-of-the-art wafer fab. and assembly plants. JJM is committed to offer high-quality auto-grade power semiconductors to tier-1 automotive OEMs.

这 32 款汽车等级 SGT MOSFETs, 芯片的设计制造及成品的封装测试, 皆在符合 IATF 16949 品质管理的工厂完成。每个器件也通过三批次、符合 AEC-Q101 标准的长期可靠性验证。优异的关键电气参数如导通电阻 (1.3 ~ 29.0mΩ)、栅极电荷 (6.8 ~ 88.0nC)、FOM (55 ~ 354) 等, 性能不输欧美大厂, 已广泛被汽车前装及后装市场接受並大规模出货。

Of these 32 auto-grade devices, the dies inside and the A/T were all produced at manufacturing sites certified for IATF 16949. All devices passed the AEC-Q101 compliant tests. Outstanding electrical characteristics like $R_{DS(ON)}$ of 1.3 ~ 29.0mΩ, Q_g of 6.8 ~ 88.0nC, FOM of 55 ~ 354 ensure reliable operation in harsh operating environment.

为实现与先进芯片的有机匹配, 保证性能与高可靠性, 在 -55 ~ 175°C 温度区间内保持长期稳定工作, PDFN3x3/5x6-8L/-D 及 TO-252/263-3/7L 的封装, 从框架到贴芯工艺、线材、焊接工艺等, 均采用 MSL1 等级及低机械温度应力材料。所有车规级 SGT MOSFETs 皆不含卤素, 且符合 RoHS 要求。

In the thermally efficient SM-type PDFN3x3 / 5x6-8L/-D, TO-252/263-3/7L, materials used (lead frame, solder, epoxy, etc.) and the manufacturing steps (wire/clip bonding, die-attach, polyimide over die-top, etc.) are of MSL1 to minimize mechanical thermal stress. As such, stable operation over $T_J = -55 \sim 175^\circ\text{C}$ are resulted. All devices shipped are halogen-free & RoHS-compliant.

Key Aspects of 40~150V Q-grade JSFET®

■ Parametric Performance to Meet the Challenge

Exceptional $R_{DS(ON)_{Typ}}$ at down to 1.3mΩ, FOM as small as 55, E_{AS_Max} as high as 889mJ lead to reliable operation under the harsh working environment typical of automobiles.

■ Robustness & Long-term Reliability

All devices passed the stringent AEC-Q101 qualification @ 3 lots & $T_J = 175^\circ\text{C}$. Wafer and A/T production facilities are IATF 16949 certified for quality management.

■ Unclamped Inductive Switching Tested

Fully UIS tested during production to confirm the device's ability to withstand the avalanche energy common in both resistive and inductive type of loads.

■ Robust & Thermal Efficient Packages

SM-type PDFN3x3/5x6-8L/-D, TO-252-3L, TO-263-3/7L with high immunity to thermal-mechanical stress enable reliable operation under excessively low / high ambient temperature.

Market Applications

- DC/DC boost for mini/LED backlighting in infotainment, LED driving in matrix headlights
直流升压驱动: 资讯娱乐面板内 mini/LED 背光、内饰环境 LED、矩阵 LED 车前照灯
- High/Low-side switching in POL DC/DC (e.g. HPC for automotive gateway & domain controller, SR rectification in OBC)
高/低侧电源开关: 车载高性能运算 (GW, DC/DC)、副边同步整流
- Load switching in various vehicle electrical systems of ICE-based and new-energy PHEV / BEV
负载开关: 传统及新能源车的各种母线系统的电子设备
- Power stages for low / medium-power BLDC/DC motor driving in BCM (body control module) & fuel pump & EPS (electronic power steering), wireless charging 半/全桥功率级: 小/中功率 DC 及 BLDC 马达驱动 (车身控制模组、油泵、电子助力转向)、Qi 兼容无线充电板
- V_{BUS} power switch for USB PD 3.0/3.1 compatible DC output via USB Type-C® connectors
USB PD 3.0/3.1 兼容 USB Type-C® 电源输出端: V_{BUS} 输出开关

Application Circuits

These 40 ~ 150V SGT MOSFETs are well suited for applications inside automobiles. Their long-term reliability were tested per AEC-Q101 quality standards. JMSL0406AGQ and its dual-die variant JMSL0406AGDQ are popular in body control module (BCM) for use cases like low-power DC motor driving. With $R_{DS(ON)}$ down to 1.3m Ω , JMSH041AGQ fits the power efficiency requirement of mid/high-power DC motors. Typical applications are: multi-way power seat, power tailgate, centralized door lock, ESC (electronic stability control). At $V_{DS_Max} = 100V$ and assembled in the low-profile PDFN5x5-8L package, JMSL1018AGQ is good for LED backlighting in flat panel display of the infotainment/ADAS unit. In contrast, JMSL1020AGDQ drives two strings of high-brightness LEDs simultaneously for backlighting in larger panel.

Figure 1: DC/DC Boost in mini/LED Backlighting

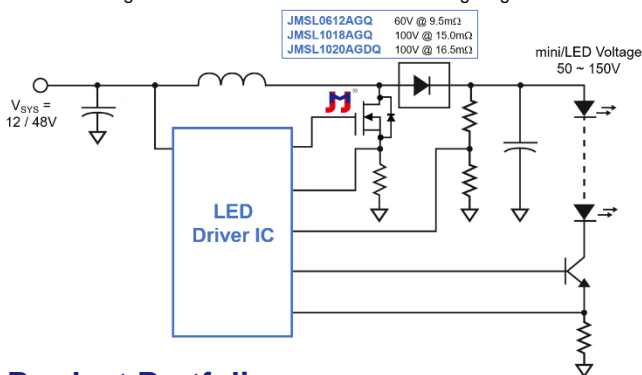
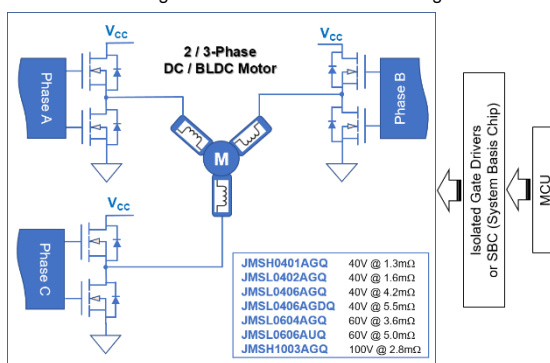


Figure 2: DC / BLDC Motor Driving



Product Portfolio

Product Name	Technology	Package	Configuration	V_{DS_Max} (V)	I_{D_Max} (A)	$R_{DS(ON)_Typ}$ @ $V_{GS}=10V$ (m Ω)	$R_{DS(ON)_Max}$ @ $V_{GS}=10V$ (m Ω)	V_{GS_Max} (V)	$V_{GS(th)_Typ}$ (V)	E_{AS_Max} (mJ)	C_{iss_Typ} (pF)	C_{oss_Typ} (pF)	C_{riss_Typ} (pF)	Q_g_Typ (nC)	FOM
JMSL0406AUQ	SGT	PDFN3x3-8L	N	40	57	4.5	5.6	± 20	1.6	36.0	1,204	536	51.0	17.9	81
JMSL0606AUQ	SGT	PDFN3x3-8L	N	60	59	5.0	6.2	± 20	1.6	94.0	2,122	440	4.8	32.0	160
JMSL0609AUQ	SGT	PDFN3x3-8L	N	60	44	7.5	9.4	± 20	1.6	34.0	1,087	309	8.5	16.6	125
JMSL0612AUQ	SGT	PDFN3x3-8L	N	60	36	10.0	12.5	± 20	1.6	20.0	731	224	7.4	13.9	139
JMSL1018AUQ	SGT	PDFN3x3-8L	N	100	29	16.2	20.0	± 20	1.8	29.0	769	171	5.1	12.7	206
JMSL1040AUQ	SGT	PDFN3x3-8L	N	100	20	29.0	39.0	± 20	1.8	14.0	363	85	3.0	6.8	197
JMSL0401AGQ	SGT	PDFN5x6-8L	N	40	198	1.3	1.7	± 20	1.6	194.0	3,125	1,607	18.0	47.0	61
JMSH0401AGQ	SGT	PDFN5x6-8L	N	40	197	1.3	1.7	± 20	2.8	194.0	3,015	2,000	18.0	42.0	55
JMSL0402AGQ	SGT	PDFN5x6-8L	N	40	183	1.6	2.0	± 20	1.6	163.0	3,133	1,993	75.0	46.0	74
JMSL0406AGQ	SGT	PDFN5x6-8L	N	40	90	4.2	5.2	± 20	1.6	36.0	1,204	536	51.0	17.9	75
JMSL0604AGQ	SGT	PDFN5x6-8L	N	60	112	3.6	4.5	± 20	1.6	94.0	2,030	445	4.4	32.0	115
JMSL0606AGQ	SGT	PDFN5x6-8L	N	60	103	4.0	5.0	± 20	1.6	94.0	2,030	445	4.4	32.0	128
JMSL0609AGQ	SGT	PDFN5x6-8L	N	60	67	7.2	9.4	± 20	1.6	34.0	1,087	309	8.5	16.6	120
JMSL0612AGQ	SGT	PDFN5x6-8L	N	60	52	9.5	12.0	± 20	1.6	20.0	731	224	7.4	13.9	132
JMSH1003AGQ	SGT	PDFN5x6-8L	N	100	170	2.8	3.5	± 20	2.7	346.0	4,374	1,140	4.7	70.0	196
JMSH1004BGQ	SGT	PDFN5x6-8L	N	100	138	3.3	4.3	± 20	2.7	231.0	3,434	906	14.0	57.0	188
JMSL1006AGQ	SGT	PDFN5x6-8L	N	100	110	4.7	5.9	± 20	1.8	110.0	2,604	567	9.6	42.0	197
JMSL1008AGQ	SGT	PDFN5x6-8L	N	100	88	6.0	7.6	± 20	1.8	102.0	2,200	445	8.0	34.0	204
JMSH1008AGQ	SGT	PDFN5x6-8L	N	100	87	6.2	7.8	± 20	2.7	144.0	1,920	445	7.0	30.0	186
JMSH1018AGQ	SGT	PDFN5x6-8L	N	100	45	15.8	19.8	± 20	2.7	39.0	769	171	5.1	12.7	201
JMSL1018AGQ	SGT	PDFN5x6-8L	N	100	47	15.0	18.7	± 20	1.8	29.0	769	171	5.1	12.7	191
JMSL1040AGQ	SGT	PDFN5x6-8L	N	100	27	29.0	36.0	± 20	1.8	14.0	363	85	3.0	6.8	197
JMSH1509AGQ	SGT	PDFN5x6-8L	N	150	87	8.5	9.9	± 20	3.2	331.0	2,181	363	7.9	30.0	255
JMSL0406AGDQ	SGT	PDFN5x6-8L-D	N+N	40	49	5.5	6.9	± 20	1.6	36.0	1,227	526	55.0	17.9	98
JMSL0610AGDQ	SGT	PDFN5x6-8L-D	N+N	60	38	8.5	10.6	± 20	1.6	34.0	1,087	309	8.5	16.6	141
JMSL0615AGDQ	SGT	PDFN5x6-8L-D	N+N	60	33	10.5	13.5	± 20	1.6	20.0	731	224	7.4	13.9	146
JMSL1020AGDQ	SGT	PDFN5x6-8L-D	N+N	100	27	16.5	20.0	± 20	1.8	29.0	769	171	5.1	12.7	210
JMSL0406AKQ	SGT	TO-252-3L	N	40	78	4.7	5.6	± 20	1.6	36.0	1,204	536	51.0	17.9	84
JMSL0606AKQ	SGT	TO-252-3L	N	60	93	4.6	5.8	± 20	1.6	94.0	2,122	440	4.4	32.0	147
JMSH1504AEQ	SGT	TO-263-3L	N	150	210	3.9	4.9	± 20	3.2	889.0	6,540	772	6.7	88.0	343
JMSH1507AEQ	SGT	TO-263-3L	N	150	161	5.2	6.5	± 20	3.2	540.0	4,320	535	7.2	68.0	354
JMSH1003AE7Q	SGT	TO-263-7L	N	100	196	2.8	3.5	± 20	2.7	406.0	4,398	1,361	8.5	66.0	185

Shipping Information

Package	# of Pins	Media	Quantity (pcs)
PDFN3x3-8L	8	13-inch Reel	3,000
PDFN5x6-8L	8	13-inch Reel	3,000
PDFN5x6-8L-D	8	13-inch Reel	3,000
TO-252-3L	3	13-inch Reel	3,000
TO-263-3L	3	13-inch Reel	800
TO-263-7L	7	13-inch Reel	800



Samples & production quantities of the Q-grade 40~150V JSFET are available from sales_sh@jjwdz.com and authorized sales distributors.