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March 2015

FDMS5672

N-Channel UltraFET Trench[®] MOSFET

60V, 22A, 11.5mΩ

Features

- Max $r_{DS(on)}$ = 11.5mΩ at V_{GS} = 10V, I_D = 10.6A
- Max $r_{DS(on)}$ = 16.5mΩ at V_{GS} = 6V, I_D = 8A
- Typ Qg = 32nC at V_{GS} = 10V
- Low Miller Charge
- Optimized Efficiency at High Frequencies
- RoHS Compliant

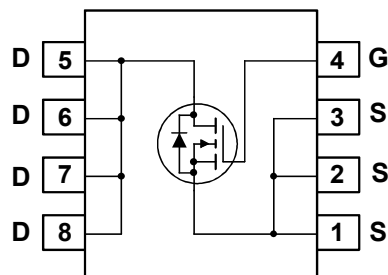
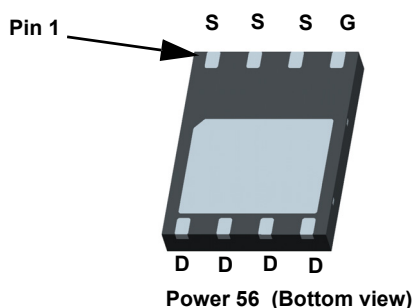


General Description

UltraFET devices combine characteristics that enable benchmark efficiency in power conversion applications. Optimized for $r_{DS(on)}$, low ESR, low total and Miller gate charge, these devices are ideal for high frequency DC to DC converters.

Application

- DC - DC Conversion



MOSFET Maximum Ratings $T_A = 25^\circ\text{C}$ unless otherwise noted.

Symbol	Parameter	Ratings	Units
V_{DS}	Drain to Source Voltage	60	V
V_{GS}	Gate to Source Voltage	± 20	V
I_D	Drain Current -Continuous $T_C = 25^\circ\text{C}$ (Note 5)	65	A
	-Continuous $T_C = 100^\circ\text{C}$ (Note 5)	39	
	-Continuous $T_A = 25^\circ\text{C}$ (Note 1a)	10.6	
	-Pulsed (Note 4)	176	
E_{AS}	Single Pulse Avalanche Energy (Note 3)	337	mJ
P_D	Power Dissipation $T_C = 25^\circ\text{C}$	78	W
	Power Dissipation $T_A = 25^\circ\text{C}$ (Note 1a)	2.5	
T_J, T_{STG}	Operating and Storage Junction Temperature Range	-55 to +150	$^\circ\text{C}$

Thermal Characteristics

$R_{\theta JC}$	Thermal Resistance, Junction to Case	1.6	$^\circ\text{C/W}$
$R_{\theta JA}$	Thermal Resistance, Junction to Ambient (Note 1a)	50	

Package Marking and Ordering Information

Device Marking	Device	Package	Reel Size	Tape Width	Quantity
FDMS5672	FDMS5672	Power 56	13"	12mm	3000 units

Electrical Characteristics $T_J = 25^\circ\text{C}$ unless otherwise noted.

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Units
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Off Characteristics

BV_{DSS}	Drain to Source Breakdown Voltage	$I_D = 250\mu\text{A}$, $V_{GS} = 0\text{V}$	60			V
$\frac{\Delta BV_{DSS}}{\Delta T_J}$	Breakdown Voltage Temperature Coefficient	$I_D = 250\mu\text{A}$, referenced to 25°C		59		mV/ $^\circ\text{C}$
I_{DSS}	Zero Gate Voltage Drain Current	$V_{DS} = 48\text{V}$, $V_{GS} = 0\text{V}$			1	μA
I_{GSS}	Gate to Source Leakage Current	$V_{GS} = \pm 20\text{V}$, $V_{DS} = 0\text{V}$			± 100	nA

On Characteristics

$V_{GS(th)}$	Gate to Source Threshold Voltage	$V_{GS} = V_{DS}$, $I_D = 250\mu\text{A}$	2	3.2	4	V
$\frac{\Delta V_{GS(th)}}{\Delta T_J}$	Gate to Source Threshold Voltage Temperature Coefficient	$I_D = 250\mu\text{A}$, referenced to 25°C		-11		mV/ $^\circ\text{C}$
$r_{DS(on)}$	Drain to Source On Resistance	$V_{GS} = 10\text{V}$, $I_D = 10.6\text{A}$		9.4	11.5	m Ω
		$V_{GS} = 6\text{V}$, $I_D = 8\text{A}$		13.0	16.5	
		$V_{GS} = 10\text{V}$, $I_D = 10.6\text{A}$, $T_J = 125^\circ\text{C}$		15.0	18.0	
g_{FS}	Forward Transconductance	$V_{DS} = 10\text{V}$, $I_D = 10.6\text{A}$		26		S

Dynamic Characteristics

C_{iss}	Input Capacitance	$V_{DS} = 30\text{V}$, $V_{GS} = 0\text{V}$, $f = 1\text{MHz}$		2100	2800	pF
C_{oss}	Output Capacitance			375	500	pF
C_{rss}	Reverse Transfer Capacitance			120	180	pF
R_g	Gate Resistance	$f = 1\text{MHz}$		1.2		Ω

Switching Characteristics

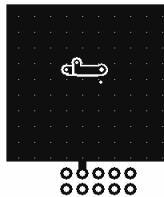
$t_{d(on)}$	Turn-On Delay Time	$V_{DD} = 30\text{V}$, $I_D = 10.6\text{A}$ $V_{GS} = 10\text{V}$, $R_{GEN} = 6\Omega$		16	29	ns
t_r	Rise Time			17	31	ns
$t_{d(off)}$	Turn-Off Delay Time			22	35	ns
t_f	Fall Time			8	16	ns
$Q_{g(TOT)}$	Total Gate Charge at 10V	$V_{GS} = 0\text{V to } 10\text{V}$	$V_{DD} = 30\text{V}$ $I_D = 10.6\text{A}$	32	45	nC
Q_{gs}	Gate to Source Gate Charge			10		nC
Q_{gd}	Gate to Drain "Miller" Charge			8.3		nC

Drain-Source Diode Characteristics

V_{SD}	Source to Drain Diode Forward Voltage	$V_{GS} = 0\text{V}$, $I_S = 10.6\text{A}$ (Note 2)		0.80	1.20	V
t_{rr}	Reverse Recovery Time	$I_F = 10.6\text{A}$, $di/dt = 100\text{A}/\mu\text{s}$		35	53	ns
Q_{rr}	Reverse Recovery Charge			42	63	nC

Notes:

- $R_{\theta JA}$ is determined with the device mounted on a 1in² pad 2 oz copper pad on a 1.5 x 1.5 in. board of FR-4 material. $R_{\theta JC}$ is guaranteed by design while $R_{\theta CA}$ is determined by the user's board design.



a. $50^\circ\text{C}/\text{W}$ when mounted on a
1 in² pad of 2 oz copper



b. $125^\circ\text{C}/\text{W}$ when mounted on a
minimum pad of 2 oz copper

- Pulse Test: Pulse Width < 300 μs , Duty cycle < 2.0%.
- Starting $T_J = 25^\circ\text{C}$, $L = 3\text{mH}$, $I_{AS} = 15\text{A}$, $V_{DD} = 60\text{V}$, $V_{GS} = 10\text{V}$.
- Pulsed I_d please refer to Fig 11 SOA graph for more details.
- Computed continuous current limited to Max Junction Temperature only, actual continuous current will be limited by thermal & electro-mechanical application board design.

Typical Characteristics $T_J = 25^\circ\text{C}$ unless otherwise noted.

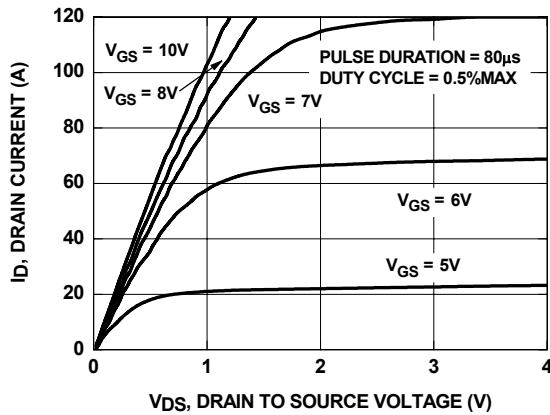


Figure 1. On Region Characteristics

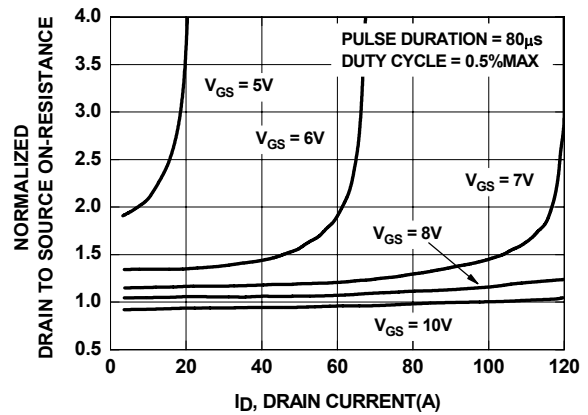


Figure 2. Normalized On-Resistance vs. Drain Current and Gate Voltage

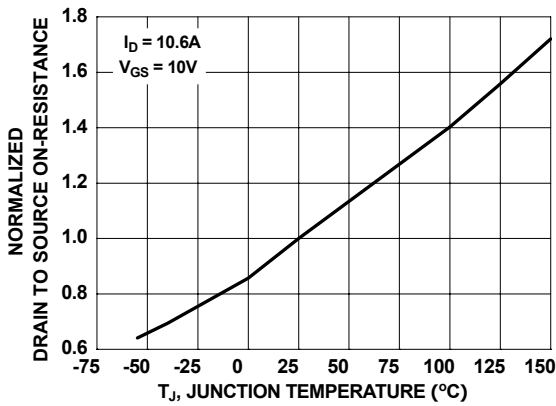


Figure 3. Normalized On Resistance vs. Junction Temperature

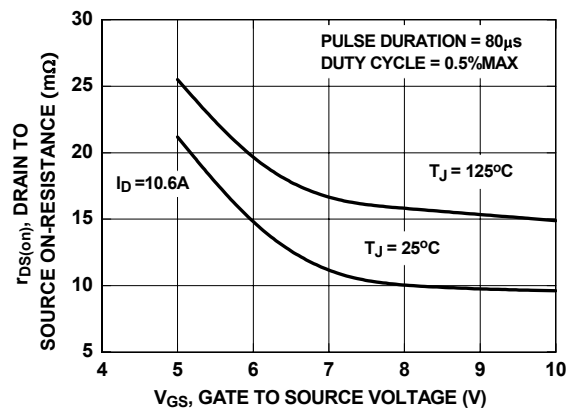


Figure 4. On-Resistance vs. Gate to Source Voltage

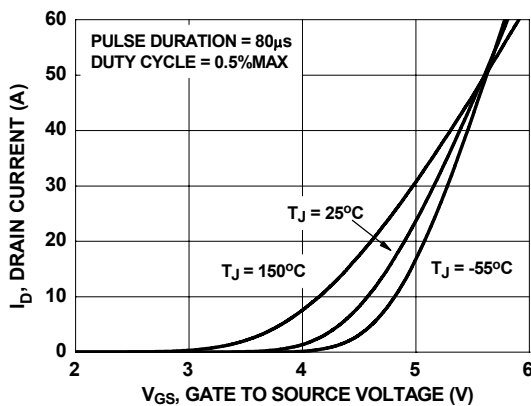


Figure 5. Transfer Characteristics

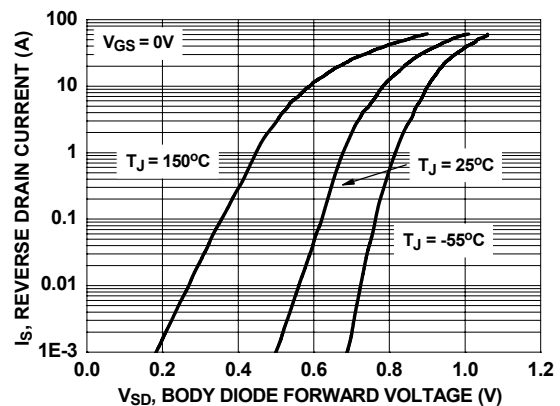


Figure 6. Source to Drain Diode Forward Voltage vs. Source Current

Typical Characteristics $T_J = 25^\circ\text{C}$ unless otherwise noted.

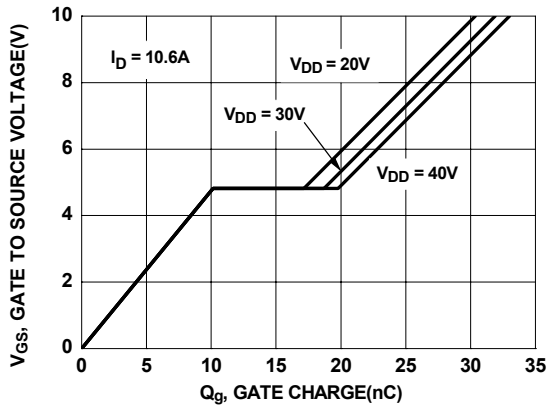


Figure 7. Gate Charge Characteristics

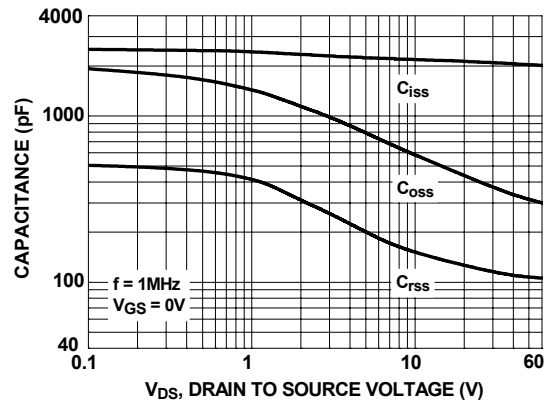


Figure 8. Capacitance vs. Drain to Source Voltage

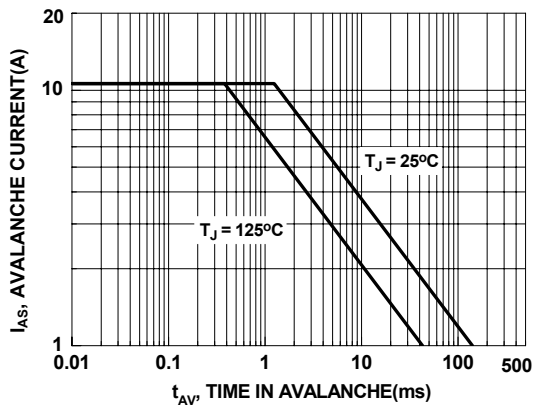


Figure 9. Unclamped Inductive Switching Capability

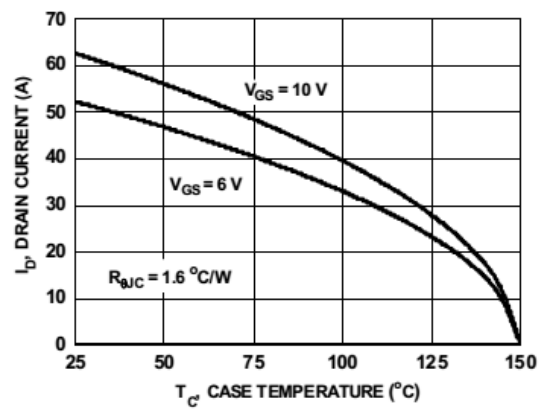


Figure 10. Maximum Continuous Drain Current vs. Case Temperature

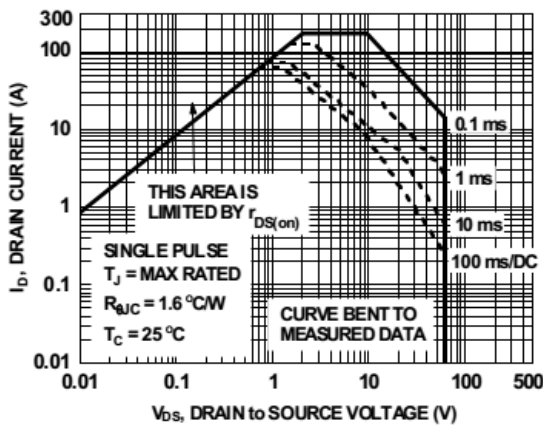


Figure 11. Forward Bias Safe Operating Area

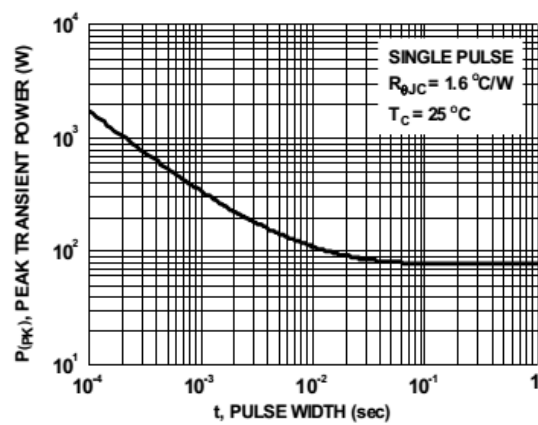
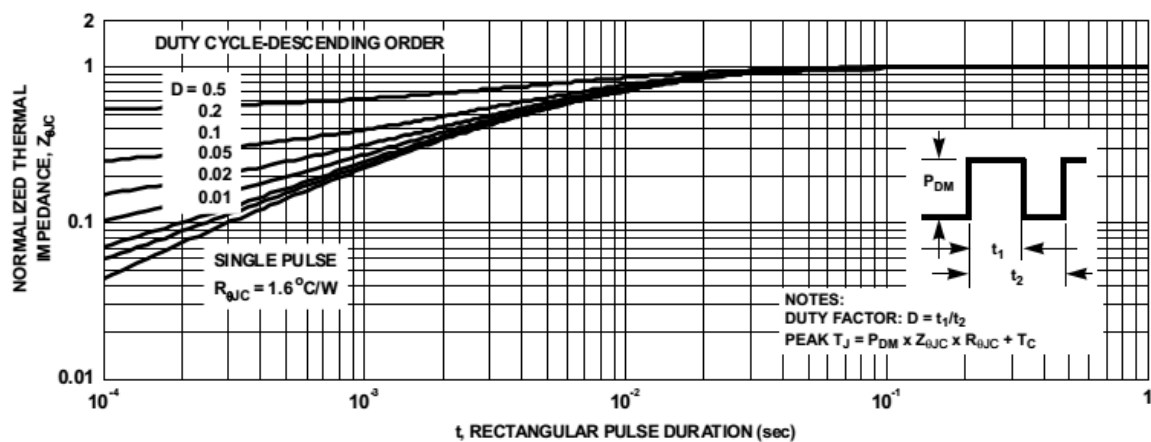
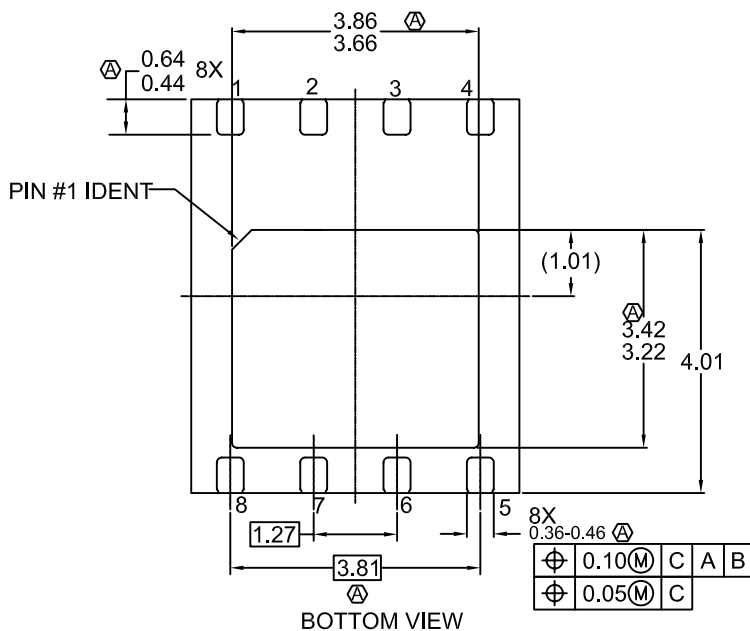
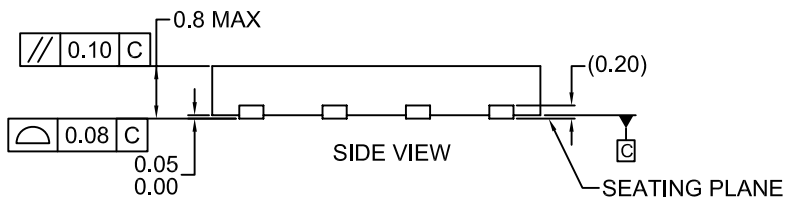
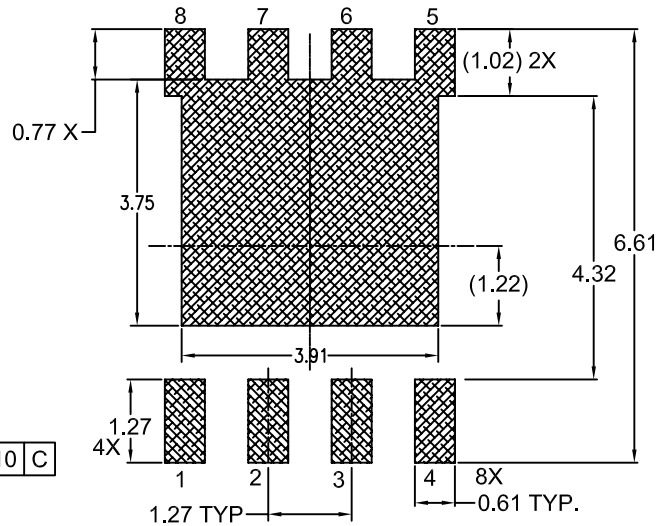
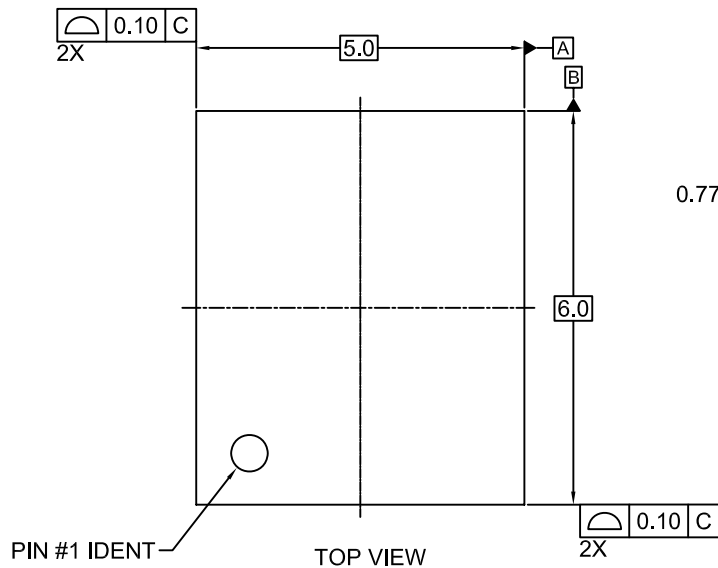


Figure 12. Single Pulse Maximum Power Dissipation

Typical Characteristics $T_J = 25^\circ\text{C}$ unless otherwise noted.



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NBR	DESCRIPTION	DATE	NAME/SITE
1	RELEASE TO DOCUMENT CONTROL	090305	David/FSPM
2	REVISE TO CORRECT DAP SIZE	080605	David/FSPM
3	I) REVISE TO CORRECT PKG THK II) REVISE THE PKG PROFILE TOLERANCE	210306	CK/FSPM
4	ADD IN LEAD LENGTH FOR LAND PATTERN	220908	LY/FSPM



NOTES:

- Ⓐ DOES NOT FULLY CONFORM TO JEDEC REGISTRATION, MO-229.
- B. DIMENSIONS ARE IN MILLIMETERS.
- C. DIMENSIONS AND TOLERANCES PER ASME Y14.5M, 1994
- D. TERMINALS 5,6,7 AND 8 ARE TIED TO THE EXPOSED PADDLE
- E. LANDPATTERN RECOMMENDATION IS BASED ON FSC DESIGN ONLY
- F. DRAWING FILENAME: MKT-MLP08Grev4

APPROVALS		DATE	FAIRCHILD SEMICONDUCTOR™	
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DFTG. CHK.	LY LIM	01 Nov 08	8LD, MLP, DUAL, NON-JEDEC, 5X6 MM BODY, TIED DAP	
ENGR. CHK.	DAVID	01 Nov 08		
PROJECTION			SCALE	SIZE
			N/A	N/A
MM			DRAWING NUMBER	REV
			MKT-MLP08G	4
DO NOT SCALE DRAWING			SHEET 1 of 1	

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