

60V COMPLEMENTARY PAIR ENHANCEMENT MODE MOSFET

Product Summary

Device	BV _{DSS}	R _{DS(ON)} Max	I _D T _A = +25°C
Q1 N-Channel	60V	$40 \text{m}\Omega$ @ $V_{GS} = 10 \text{V}$	6.5A
Q1 N-Channel		$55m\Omega @ V_{GS} = 4.5V$	5.6A
Q2 P-Channel	-60V	110mΩ @ V _{GS} = -10V	-3.9A
Q2 P-Channel		130mΩ @ $V_{GS} = -4.5V$	-3.6A

Description and Applications

This MOSFET is designed to meet the stringent requirements of automotive applications. It is qualified to AEC-Q101, supported by a PPAP and is ideal for use in:

- DC-DC Converters
- Power Management Functions
- Backlighting

Features and Benefits

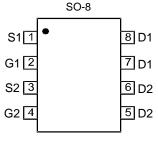
- Low Input Capacitance
- Low On-Resistance
- Fast Switching Speed
- Totally Lead-Free & Fully RoHS Compliant (Notes 1 & 2)
- Halogen and Antimony Free. "Green" Device (Note 3)
- Qualified to AEC-Q101 Standards for High Reliability
- PPAP Capable (Note 4)

Mechanical Data

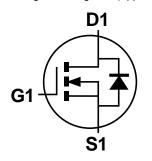
- Case: SO-8
- Case Material: Molded Plastic, "Green" Molding Compound.
 UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminal Connections: See Diagram
- Terminals: Finish Tin Finish Annealed over Copper Leadframe.
 Solderable per MIL-STD-202, Method 208 ³
- Weight: 0.074 grams (Approximate)



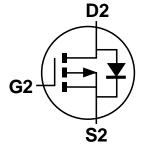




Top View Pin Configuration



Q1 N-Channel MOSFET



Q2 P-Channel MOSFET

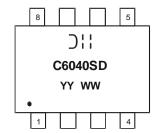
Ordering Information (Note 5)

Part Number	Case	Packaging
DMC6040SSDQ-13	SO-8	2,500/Tape & Reel

Notes:

- 1. No purposely added lead. Fully EU Directive 2002/95/EC (RoHS) & 2011/65/EU (RoHS 2) compliant.
- 2. See http://www.diodes.com/quality/lead_free.html for more information about Diodes Incorporated's definitions of Halogen- and Antimony-free, "Green" and Lead-free
- 3. Halogen- and Antimony-free "Green" products are defined as those which contain <900ppm bromine, <900ppm chlorine (<1500ppm total Br + Cl) and <1000ppm antimony compounds.
- 4. Automotive products are AEC-Q101 qualified and are PPAP capable. Refer to http://www.diodes.com/product_compliance_definitions.html
- 5. For packaging details, go to our website at http://www.diodes.com/products/packages.html.

Marking Information



);; = Manufacturer's Marking C6040SD = Product Type Marking Code YYWW = Date Code Marking YY or YY = Year (ex: 16 = 2016) WW = Week (01 - 53)



Maximum Ratings (@TA = +25°C, unless otherwise specified.)

Characteristic	Symbol	Q1	Q2	Units		
Drain-Source Voltage	V_{DSS}	60	-60	V		
Gate-Source Voltage	V_{GSS}	±20	±20	V		
Continuous Dusis Coment (Nata 7) V	Steady State	$T_A = +25^{\circ}C$ $T_A = +70^{\circ}C$	I _D	5.1 4.1	-3.1 -2.5	А
Continuous Drain Current (Note 7) V _{GS} = -10V	$T_A = +25^{\circ}C$ $T_A = +70^{\circ}C$		I _D	6.5 5.2	-3.9 -3.1	А
Maximum Body Diode Forward Current (Note 7)	Is	2.1	-2.1	Α		
Pulsed Drain Current (10µs Pulse, Duty Cycle =	I _{DM}	28	-19	Α		
Avalanche Current (Note 8) L = 0.1mH	I _{AS}	17.2	-17.6	Α		
Avalanche Energy (Note 8) L = 0.1mH			E _{AS}	14.7	15.4	mJ

Thermal Characteristics ($@T_A = +25^{\circ}C$, unless otherwise specified.)

Characteristic	Symbol	Value	Units	
Total Power Dissipation (Note 6)	T _A = +25°C	0	1.24	W
Total Power Dissipation (Note 6)	$T_A = +70^{\circ}C$	P_{D}	0.8	
Thermal Resistance, Junction to Ambient (Note 6)	Steady State	D	101	°C/W
Thermal Resistance, Junction to Ambient (Note 6)	t < 10s	$R_{\theta JA}$	61	
Total Power Dissipation (Note 7)	$T_A = +25$ °C	D	1.56	W
Total Power Dissipation (Note 1)	$T_A = +70^{\circ}C$	P_{D}	1.0	
Thermal Resistance, Junction to Ambient (Note 7)	Steady State	D	80	°C/W
Thermal Resistance, Junction to Ambient (Note 7)	t<10s	$R_{\theta JA}$	49	
Thermal Resistance, Junction to Case (Note 7)		$R_{ heta JC}$	14.7	
Operating and Storage Temperature Range		T _{J,} T _{STG}	-55 to +150	°C

Electrical Characteristics – N-Channel Q1 (@T_A = +25°C, unless otherwise specified.)

Characteristic	Symbol	Min	Тур	Max	Unit	Test Condition
OFF CHARACTERISTICS (Note 9)						
Drain-Source Breakdown Voltage	BV _{DSS}	60	_	_	V	$V_{GS} = 0V, I_D = 250\mu A$
Zero Gate Voltage Drain Current	I _{DSS}	_	_	1	μΑ	$V_{DS} = 48V, V_{GS} = 0V$
Gate-Source Leakage	I _{GSS}	_	_	±100	nA	$V_{GS} = \pm 20V, V_{DS} = 0V$
ON CHARACTERISTICS (Note 9)						
Gate Threshold Voltage	V _{GS(TH)}	1	_	3	V	$V_{DS} = V_{GS}, I_{D} = 250 \mu A$
Static Drain-Source On-Resistance			33	40	mΩ	$V_{GS} = 10V, I_D = 8A$
Static Diani-Source Off-Resistance	R _{DS(ON)}		37	55	11122	$V_{GS} = 4.5V, I_D = 5A$
Diode Forward Voltage	V_{SD}		0.7	1.2	V	$V_{GS} = 0V$, $I_S = 1A$
DYNAMIC CHARACTERISTICS (Note 10)						
Input Capacitance	C _{ISS}		1,130	_		
Output Capacitance	Coss	_	69	_	pF	$V_{DS} = 15V$, $V_{GS} = 0V$ f = 1.0MHz
Reverse Transfer Capacitance	C _{RSS}	_	42	_		
Gate Resistance	R_{G}	_	1.7	_	Ω	$V_{DS} = 0V, V_{GS} = 0V, f = 1.0MHz$
Total Gate Charge (V _{GS} = 10V)	Q_{G}		20.8	_		
Total Gate Charge (V _{GS} = 4.5V)	Q_{G}		9.4	_	nC	1/ 201/ 1 4.24
Gate-Source Charge	Q_{GS}		3.3	_	IIC	$V_{DS} = 30V, I_{D} = 4.3A$
Gate-Drain Charge	Q_{GD}	_	3.0	_		
Turn-On Delay Time	t _{D(ON)}		3.6	_		$V_{GS} = 10V, V_{DD} = 30V, R_G = 6\Omega,$ $I_D = 4.3A$
Turn-On Rise Time	t_R	_	1.8	_	ns	
Turn-Off Delay Time	t _{D(OFF)}	_	20.1	_	115	
Turn-Off Fall Time	t _F	_	4.3	_		
Body Diode Reverse Recovery Time	t _{RR}		14.2	_	ns	$I_S = 4.3A$, $dI/dt = 100A/\mu s$
Body Diode Reverse Recovery Charge	Q_{RR}	_	7.5	_	nC	$I_S = 4.3A$, $dI/dt = 100A/\mu s$

Notes: 6. Device mounted on FR-4 substrate PC board, 2oz copper, with minimum recommended pad layout.

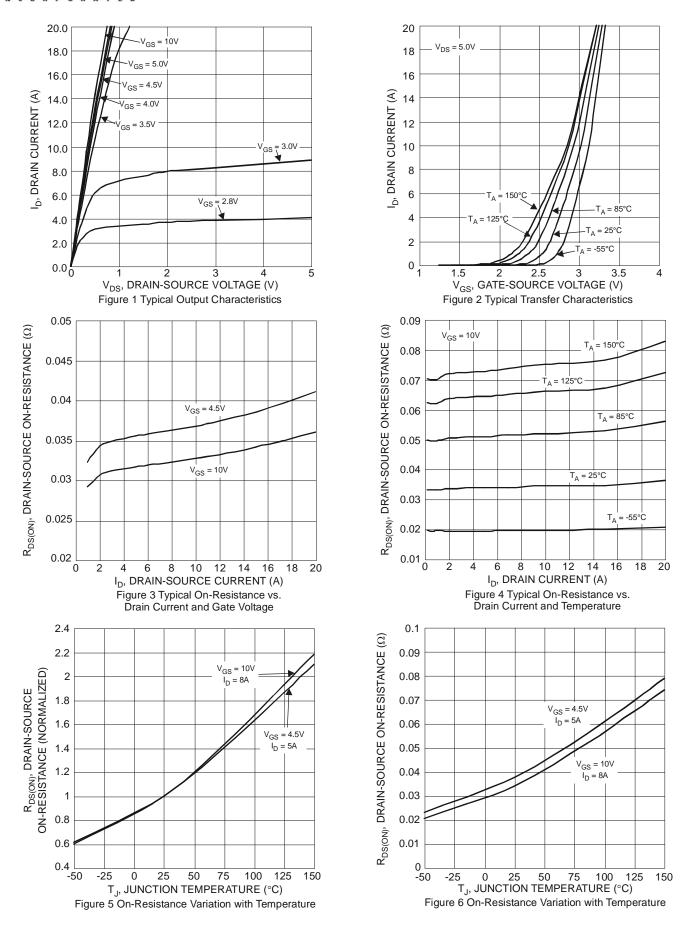
^{7.} Device mounted on FR-4 substrate PC board, 2oz copper, with 1inch square copper plate.

^{8.} UIS in production with L = 0.1mH, starting T_A = +25°C.

^{9.} Short duration pulse test used to minimize self-heating effect.

^{10.} Guaranteed by design. Not subject to product testing.







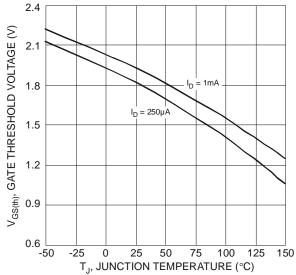
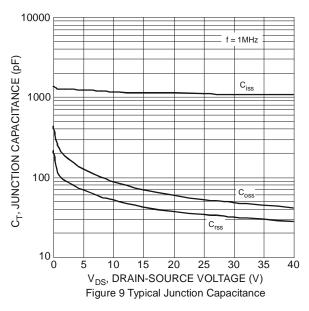
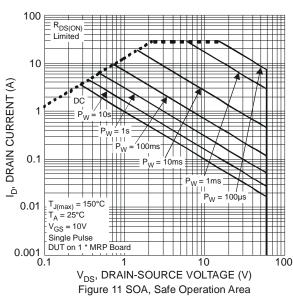
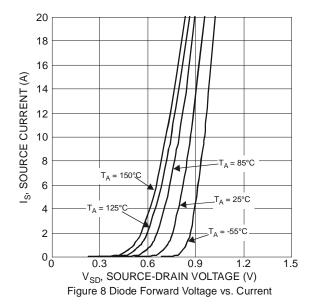
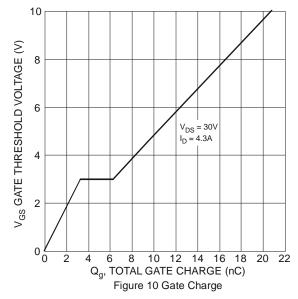


Figure 7 Gate Threshold Variation vs. Ambient Temperature

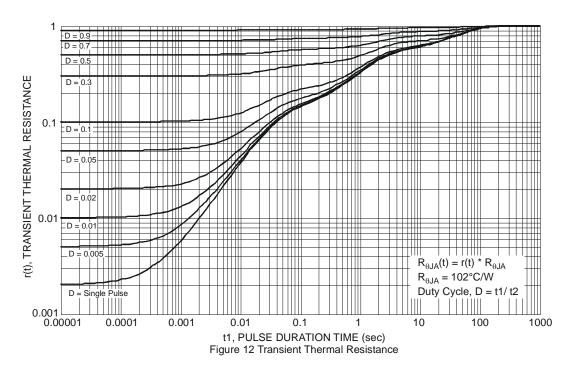












Electrical Characteristics - P-Channel Q2 (@T_A = +25°C, unless otherwise specified.)

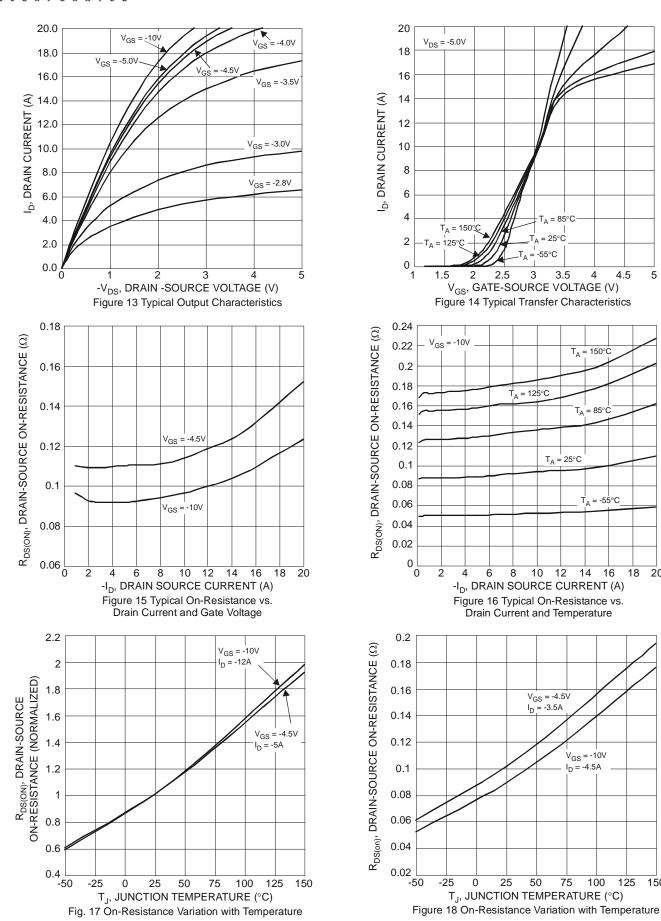
Characteristic	Symbol	Min	Тур	Max	Unit	Test Condition
OFF CHARACTERISTICS (Note 9)						
Drain-Source Breakdown Voltage	BV _{DSS}	-60	_		V	$V_{GS} = 0V, I_D = -250\mu A$
Zero Gate Voltage Drain Current	I _{DSS}	_	_	-1	μΑ	$V_{DS} = -48V, V_{GS} = 0V$
Gate-Source Leakage	I _{GSS}	_	_	100	nA	$V_{GS} = \pm 16V, V_{DS} = 0V$
ON CHARACTERISTICS (Note 9)						
Gate Threshold Voltage	V _{GS(TH)}	-1	_	-3	V	$V_{DS} = V_{GS}, I_{D} = -250 \mu A$
Static Drain-Source On-Resistance		_	91	110	mΩ	$V_{GS} = -10V, I_D = -4.5A$
Static Drain-Source On-Resistance	R _{DS(ON)}	_	110	130	11177	$V_{GS} = -4.5V, I_D = -3.5A$
Diode Forward Voltage	V_{SD}	_	-0.7	-1.2	V	$V_{GS} = 0V, I_{S} = -1A$
DYNAMIC CHARACTERISTICS (Note 10)						
Input Capacitance	C _{ISS}	_	1,030	_		V _{DS} = -30V, V _{GS} = 0V, f = 1.0MHz
Output Capacitance	Coss	_	49.1	_	pF	
Reverse Transfer Capacitance	C _{RSS}	_	38.7	_		
Gate Resistance	R_{G}	_	13.6	_	Ω	$V_{DS} = 0V, V_{GS} = 0V, f = 1.0MHz$
Total Gate Charge (V _{GS} = -4.5V)	Q_{G}	_	9.5	_		
Total Gate Charge (V _{GS} = -10V)	Q_{G}	_	19.4		nC	
Gate-Source Charge	Q _{GS}	_	2.3	_	nc	$V_{DS} = -30V, I_{D} = -5A$
Gate-Drain Charge	Q_{GD}	_	3.6	_		
Turn-On Delay Time	t _{D(ON)}	_	3.7	_		$V_{GS} = -10V$, $V_{DS} = -30V$, $R_{GEN} = 6\Omega$,
Turn-On Rise Time	t _R	_	6.3			
Turn-Off Delay Time	t _{D(OFF)}	_	58.7	_	ns	$I_D = -5A$
Turn-Off Fall Time	t _F	_	26.1	_		
Body Diode Reverse Recovery Time	t _{RR}	_	14.85		ns	I _S = -5A, dI/dt = 100A/μs
Body Diode Reverse Recovery Charge	Q_{RR}	_	8.8	_	nC	I _S = -5A, dI/dt = 100A/µs

Notes: 9. Short duration pulse test used to minimize self-heating effect.

10. Guaranteed by design. Not subject to product testing.

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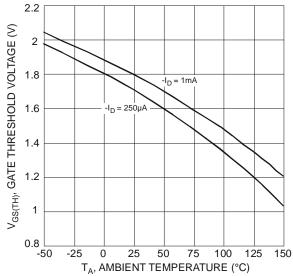
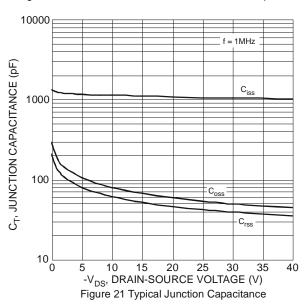
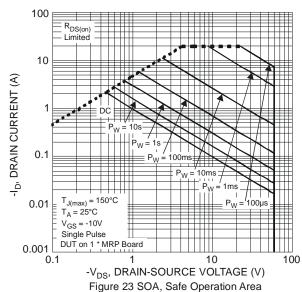
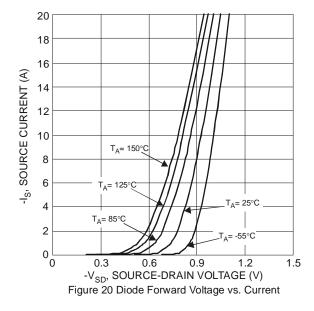
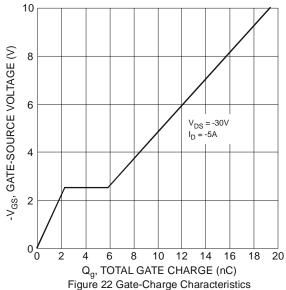


Figure 19 Gate Threshold Variation vs. Ambient Temperature







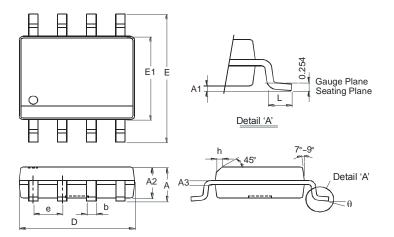




Package Outline Dimensions

Please see http://www.diodes.com/package-outlines.html for the latest version.

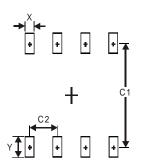
SO-8



SO-8					
Dim	Min	Max			
Α	_	1.75			
A1	0.10	0.20			
A2	1.30	1.50			
A3	0.15	0.25			
b	0.3	0.5			
D	4.85	4.95			
Е	5.90	6.10			
E1	3.85	3.95			
е	1.27 Typ				
h	1	0.35			
L	0.62	0.82			
θ	0°	8°			
All Dimensions in mm					

Suggested Pad Layout

Please see http://www.diodes.com/package-outlines.html for the latest version.



SO-8

Dimensions	Value (in mm)
Х	0.60
Y	1.55
C1	5.4
C2	1 27



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многоканальный

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