



Is Now Part of



ON Semiconductor®

To learn more about ON Semiconductor, please visit our website at

www.onsemi.com

ON Semiconductor and the ON Semiconductor logo are trademarks of Semiconductor Components Industries, LLC dba ON Semiconductor or its subsidiaries in the United States and/or other countries. ON Semiconductor owns the rights to a number of patents, trademarks, copyrights, trade secrets, and other intellectual property. A listing of ON Semiconductor's product/patent coverage may be accessed at www.onsemi.com/site/pdf/Patent-Marking.pdf. ON Semiconductor reserves the right to make changes without further notice to any products herein. ON Semiconductor makes no warranty, representation or guarantee regarding the suitability of its products for any particular purpose, nor does ON Semiconductor assume any liability arising out of the application or use of any product or circuit, and specifically disclaims any and all liability, including without limitation special, consequential or incidental damages. Buyer is responsible for its products and applications using ON Semiconductor products, including compliance with all laws, regulations and safety requirements or standards, regardless of any support or applications information provided by ON Semiconductor. "Typical" parameters which may be provided in ON Semiconductor data sheets and/or specifications can and do vary in different applications and actual performance may vary over time. All operating parameters, including "Typicals" must be validated for each customer application by customer's technical experts. ON Semiconductor does not convey any license under its patent rights nor the rights of others. ON Semiconductor products are not designed, intended, or authorized for use as a critical component in life support systems or any FDA Class 3 medical devices or medical devices with a same or similar classification in a foreign jurisdiction or any devices intended for implantation in the human body. Should Buyer purchase or use ON Semiconductor products for any such unintended or unauthorized application, Buyer shall indemnify and hold ON Semiconductor and its officers, employees, subsidiaries, affiliates, and distributors harmless against all claims, costs, damages, and expenses, and reasonable attorney fees arising out of, directly or indirectly, any claim of personal injury or death associated with such unintended or unauthorized use, even if such claim alleges that ON Semiconductor was negligent regarding the design or manufacture of the part. ON Semiconductor is an Equal Opportunity/Affirmative Action Employer. This literature is subject to all applicable copyright laws and is not for resale in any manner.



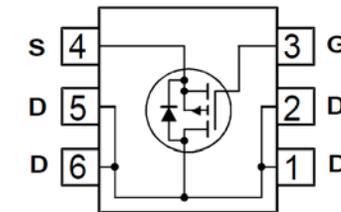
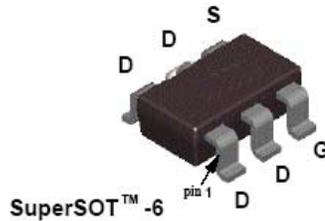
FDC642P_F085

P-Channel PowerTrench[®] MOSFET

-20V, -4A, 100mΩ

Features

- Typ $R_{DS(on)}$ = 52.5mΩ at $V_{GS} = -4.5V$, $I_D = -4A$
- Typ $R_{DS(on)}$ = 75.3mΩ at $V_{GS} = -2.5V$, $I_D = -3.2A$
- Fast switching speed
- Low gate charge(6.9nC typical)
- High performance trench technology for extremely low $R_{DS(on)}$
- SuperSOT[™]-6 package:small footprint(72% smaller than standard SO-8);low profile(1mm thick).
- RoHS Compliant
- Qualified to AEC Q101



Applications

- Load switch
- Battery protection
- Power management

MOSFET Maximum Ratings $T_A = 25^\circ C$ unless otherwise noted

Symbol	Parameter	Ratings	Units
V_{DSS}	Drain to Source Voltage	-20	V
V_{GS}	Gate to Source Voltage	±8	V
I_D	Drain Current Continuous ($V_{GS} = 4.5V$)	-4	A
	Pulsed	-20	
E_{AS}	Single Pulse Avalanche Energy (Note 1)	72	mJ
P_D	Power Dissipation	1.2	W
T_J, T_{STG}	Operating and Storage Temperature	-55 to +150	°C
$R_{\theta JC}$	Thermal Resistance Junction to Case	30	°C/W
$R_{\theta JA}$	Thermal Resistance Junction to Ambient, 1in ² copper pad area	103	°C/W

Package Marking and Ordering Information

Device Marking	Device	Package	Reel Size	Tape Width	Quantity
FDC642P	FDC642P_F085	SSOT-6	7"	8mm	3000 units

Notes:

- 1: Starting $T_J = 25^\circ C$, $L = 14.1mH$, $I_{AS} = -3.2A$
- 2: A suffix as "...F085P" has been temporarily introduced in order to manage a double source strategy as Fairchild has officially announced in Aug 2014.

FDC642P_F085 P-Channel PowerTrench[®] MOSFET

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

Symbol	Parameter	Test Conditions	Min	Typ	Max	Units
--------	-----------	-----------------	-----	-----	-----	-------

Off Characteristics

$B_{V_{DSS}}$	Drain to Source Breakdown Voltage	$I_D = -250\mu\text{A}, V_{GS} = 0\text{V}$	-20	-	-	V
I_{DSS}	Zero Gate Voltage Drain Current	$V_{DS} = -16\text{V},$ $V_{GS} = 0\text{V}$	-	-	-1	μA
		$T_A = 150^\circ\text{C}$	-	-	-250	
I_{GSS}	Gate to Source Leakage Current	$V_{GS} = \pm 8\text{V}$	-	-	± 100	nA

On Characteristics

$V_{GS(th)}$	Gate to Source Threshold Voltage	$V_{GS} = V_{DS}, I_D = -250\mu\text{A}$	-0.4	-0.7	-1.5	V
$r_{DS(on)}$	Drain to Source On Resistance	$I_D = -4\text{A}, V_{GS} = -4.5\text{V}$	-	52.5	65	m Ω
		$I_D = -3.2\text{A}, V_{GS} = -2.5\text{V}$	-	75.3	100	
		$I_D = -4\text{A}, V_{GS} = -4.5\text{V}$ $T_J = 125^\circ\text{C}$	-	72.7	105	
g_{FS}	Forward Transconductance	$I_D = -4\text{A}, V_{DD} = -5\text{V}$	-	10	-	S

Dynamic Characteristics

C_{iss}	Input Capacitance	$V_{DS} = -10\text{V}, V_{GS} = 0\text{V},$ $f = 1\text{MHz}$	-	630	-	pF
C_{oss}	Output Capacitance		-	160	-	pF
C_{rss}	Reverse Transfer Capacitance		-	65	-	pF
R_G	Gate Resistance	$f = 1\text{MHz}$	-	4.4	-	Ω
$Q_{g(TOT)}$	Total Gate Charge at -4.5V	$V_{GS} = 0$ to -4.5V	-	6.9	9.0	nC
Q_{gs}	Gate to Source Gate Charge	$V_{DD} = -10\text{V}$ $I_D = -4\text{A}$	-	1.2	-	nC
Q_{gd}	Gate to Drain "Miller" Charge		-	1.8	-	nC

Switching Characteristics

t_{on}	Turn-On Time	$V_{DD} = -10\text{V}, I_D = -1\text{A}$ $V_{GS} = -4.5\text{V}, R_{GS} = 6\Omega$	-	-	23	ns
$t_{d(on)}$	Turn-On Delay Time		-	7.3	-	ns
t_r	Rise Time		-	5.5	-	ns
$t_{d(off)}$	Turn-Off Delay Time		-	23.2	-	ns
t_f	Fall Time		-	9.6	-	ns
t_{off}	Turn-Off Time		-	-	53	ns

Drain-Source Diode Characteristics

V_{SD}	Source to Drain Diode Voltage	$I_{SD} = -1.3\text{A}$	-	-	-1.25	V
		$I_{SD} = -0.65\text{A}$	-	-	-1.0	
t_{rr}	Reverse Recovery Time	$I_{SD} = -1.3\text{A}, dI_{SD}/dt = 100\text{A}/\mu\text{s}$	-	17	22	ns
Q_{rr}	Reverse Recovery Charge		-	5.6	7.3	nC

Typical Characteristics

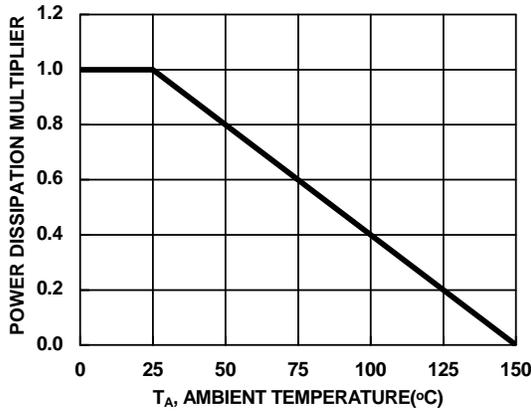


Figure 1. Normalized Power Dissipation vs Ambient Temperature

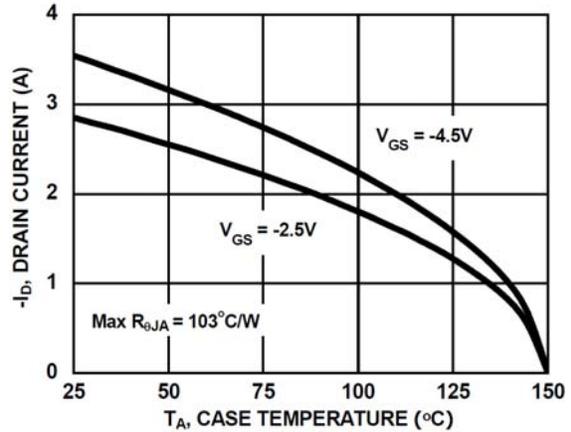


Figure 2. Maximum Continuous Drain Current vs Ambient Temperature

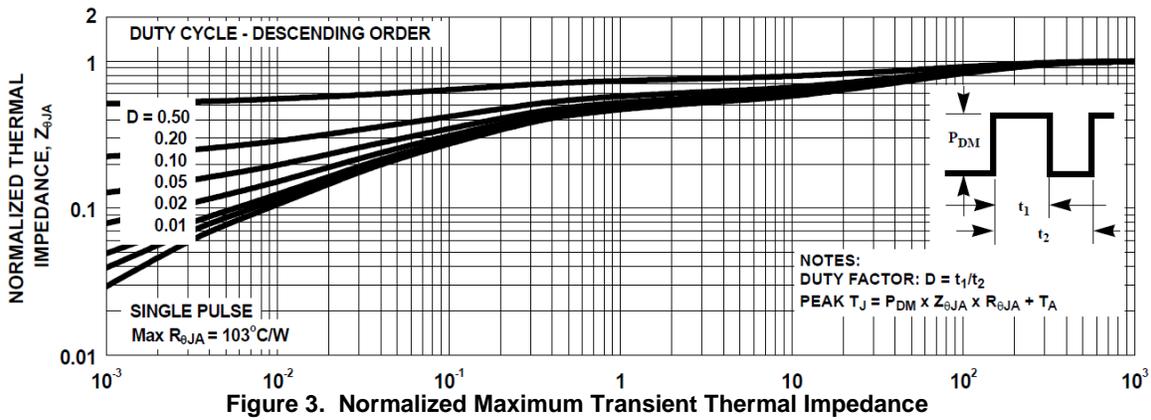


Figure 3. Normalized Maximum Transient Thermal Impedance

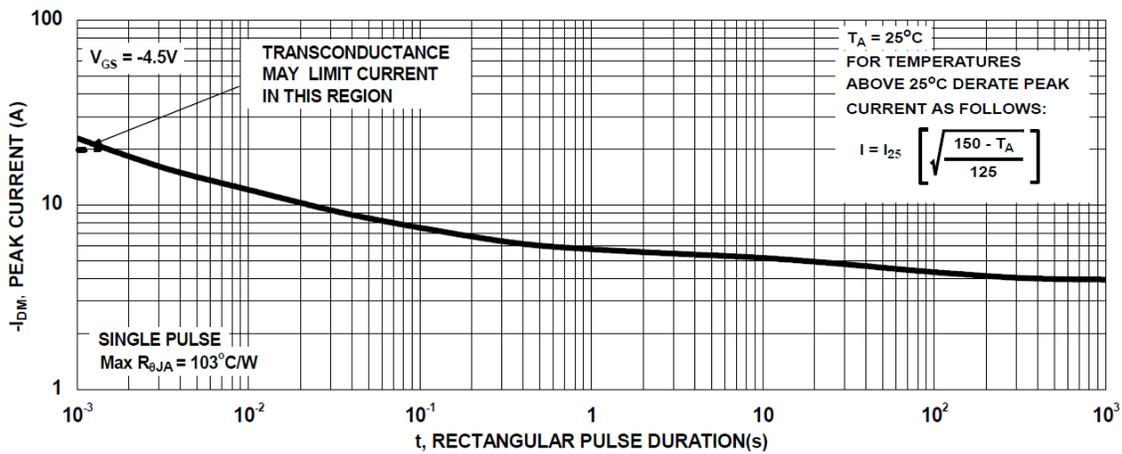


Figure 4. Peak Current Capability

Typical Characteristics

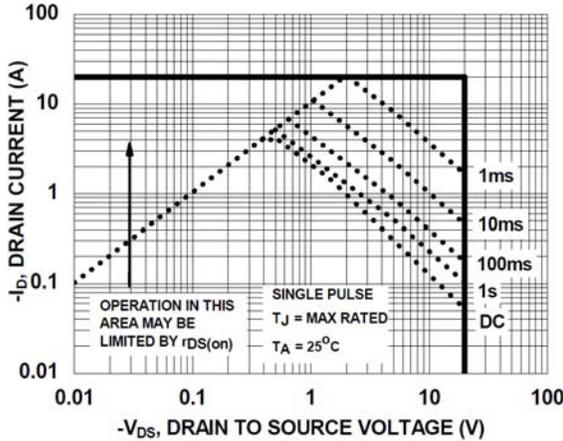
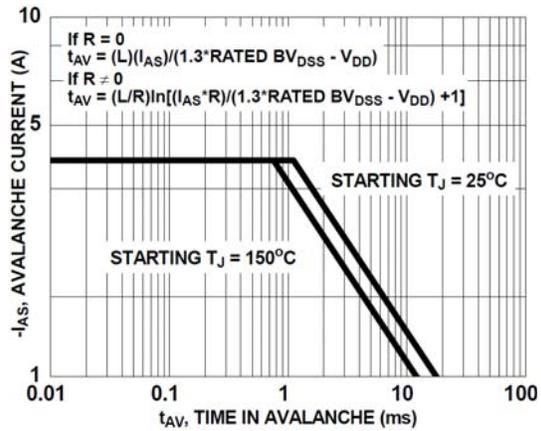


Figure 5. Forward Bias Safe Operating Area



NOTE: Refer to Fairchild Application Notes AN7514 and AN7515

Figure 6. Unclamped Inductive Switching Capability

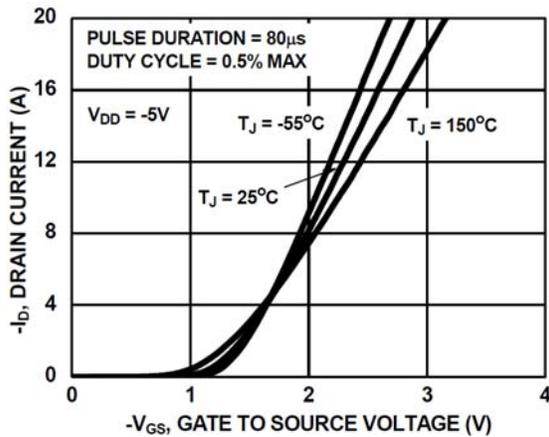


Figure 7. Transfer Characteristics

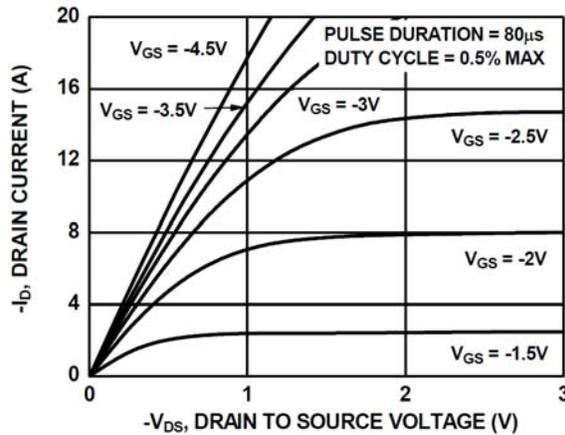


Figure 8. Saturation Characteristics

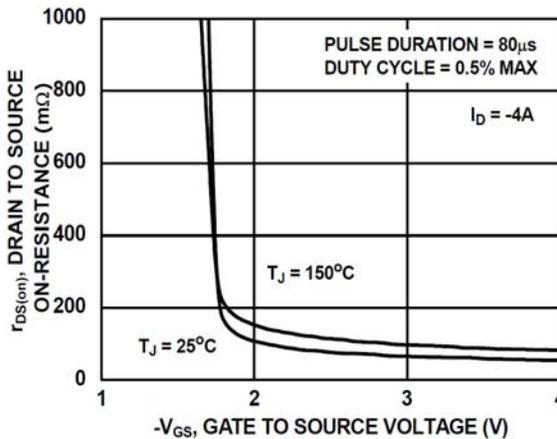


Figure 9. Drain to Source On-Resistance Variation vs Gate to Source Voltage

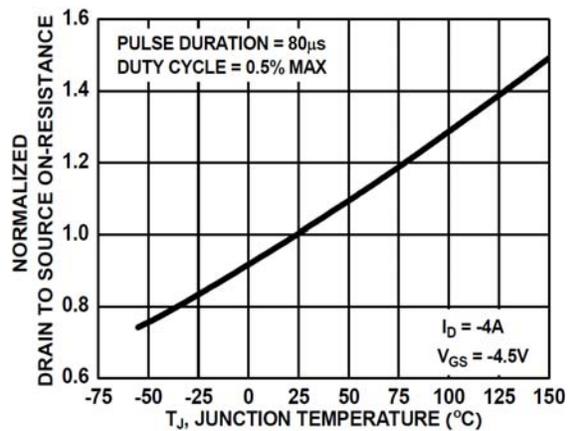


Figure 10. Normalized Drain to Source On-Resistance vs Junction Temperature

Typical Characteristics

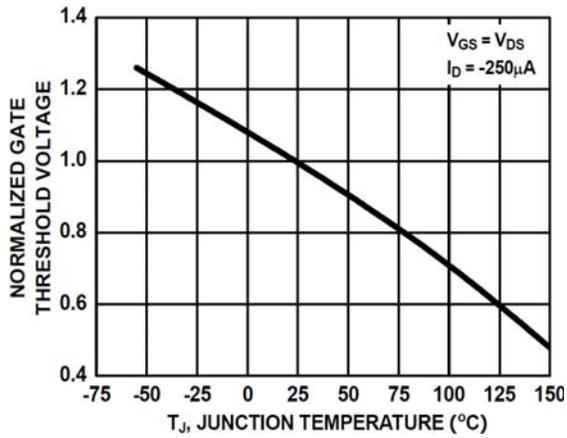


Figure 11. Normalized Gate Threshold Voltage vs Junction Temperature

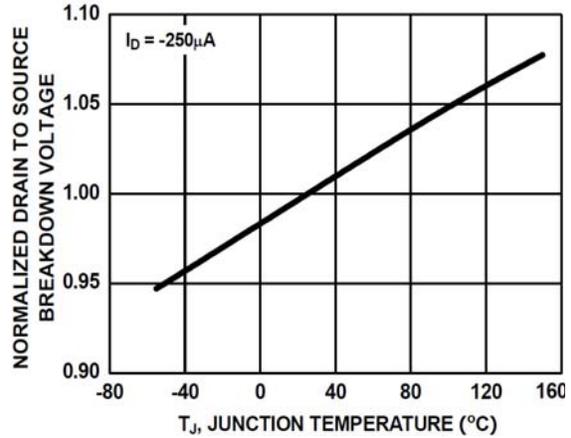


Figure 12. Normalized Drain to Source Breakdown Voltage vs Junction Temperature

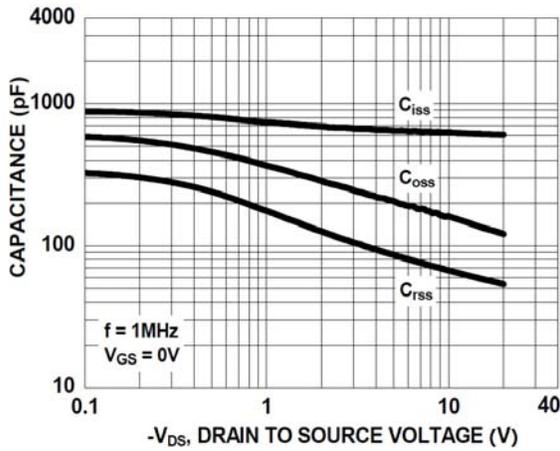


Figure 13. Capacitance vs Drain to Source Voltage

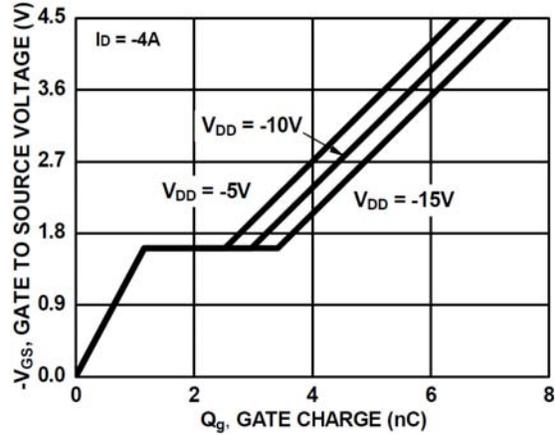
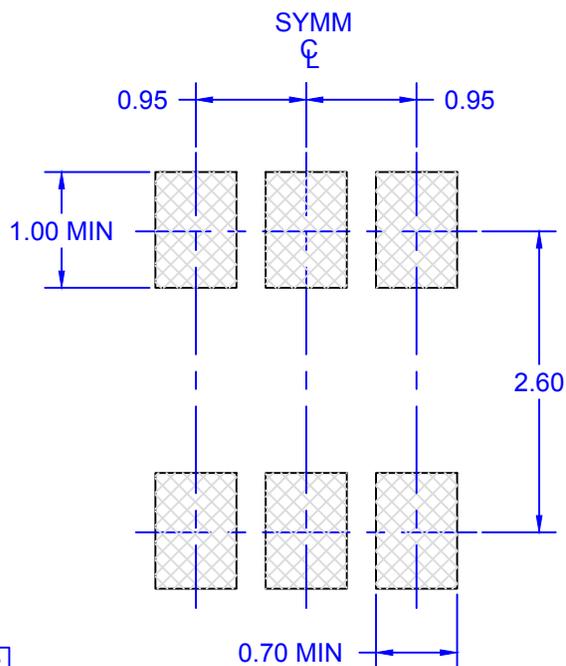
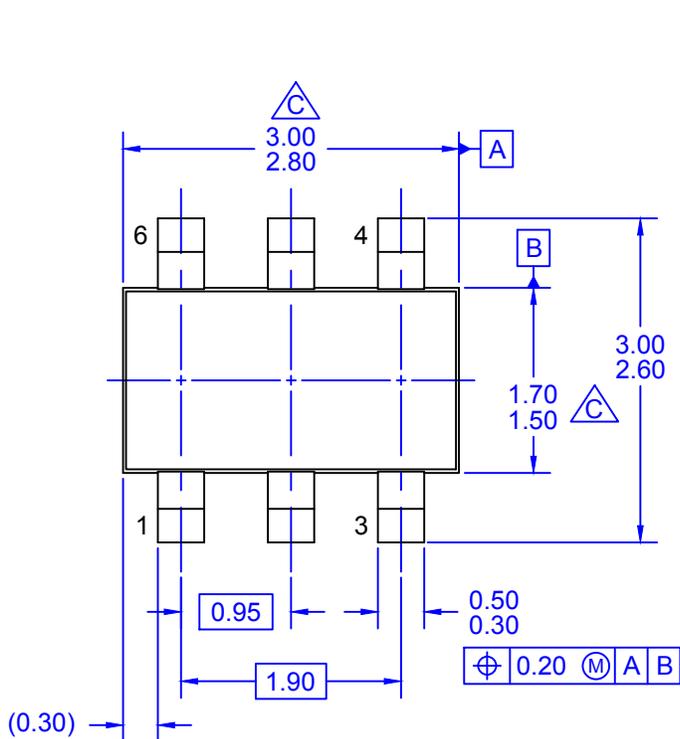
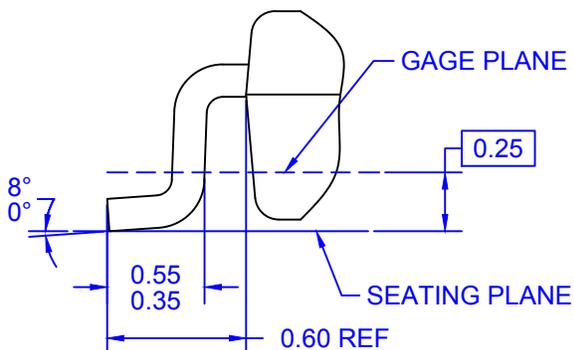
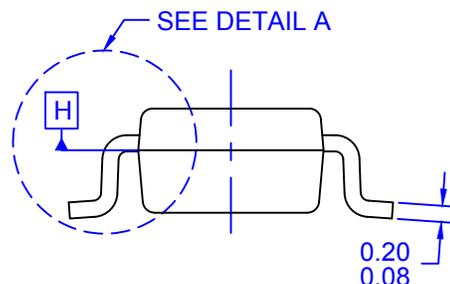
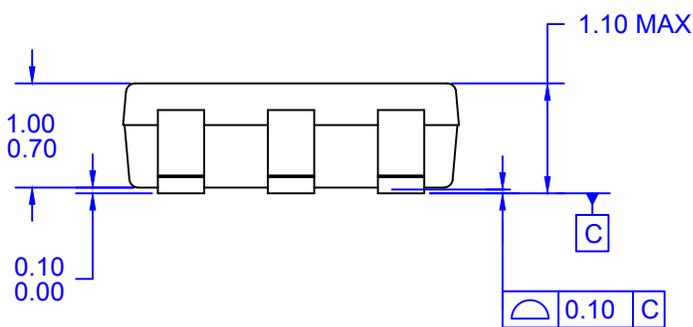


Figure 14. Gate Charge vs Gate to Source Voltage



LAND PATTERN RECOMMENDATION



DETAIL A
SCALE: 50X

- NOTES: UNLESS OTHERWISE SPECIFIED
- A) THIS PACKAGE CONFORMS TO JEDEC MO-193. VAR. AA, ISSUE E.
 - B) ALL DIMENSIONS ARE IN MILLIMETERS.
 - C) PACKAGE LENGTH DOES NOT INCLUDE MOLD FLASH, PROTRUSIONS OR GATE BURRS. MOLD FLASH, PROTRUSIONS OR GATE BURRS SHALL NOT EXCEED 0.25mm PER END. PACKAGE WIDTH DOES NOT INCLUDE INTERLEAD FLASH OR PROTRUSION. INTERLEAD FLASH OR PROTRUSION SHALL NOT EXCEED 0.25mm PER SIDE. PACKAGE LENGTH AND WIDTH DIMENSIONS ARE DETERMINED AT DATUM H.
 - D) DRAWING FILE NAME: MKT-MA06AREVF

ON Semiconductor



ON Semiconductor and  are trademarks of Semiconductor Components Industries, LLC dba ON Semiconductor or its subsidiaries in the United States and/or other countries. ON Semiconductor owns the rights to a number of patents, trademarks, copyrights, trade secrets, and other intellectual property. A listing of ON Semiconductor's product/patent coverage may be accessed at www.onsemi.com/site/pdf/Patent-Marking.pdf. ON Semiconductor reserves the right to make changes without further notice to any products herein. ON Semiconductor makes no warranty, representation or guarantee regarding the suitability of its products for any particular purpose, nor does ON Semiconductor assume any liability arising out of the application or use of any product or circuit, and specifically disclaims any and all liability, including without limitation special, consequential or incidental damages. Buyer is responsible for its products and applications using ON Semiconductor products, including compliance with all laws, regulations and safety requirements or standards, regardless of any support or applications information provided by ON Semiconductor. "Typical" parameters which may be provided in ON Semiconductor data sheets and/or specifications can and do vary in different applications and actual performance may vary over time. All operating parameters, including "Typicals" must be validated for each customer application by customer's technical experts. ON Semiconductor does not convey any license under its patent rights nor the rights of others. ON Semiconductor products are not designed, intended, or authorized for use as a critical component in life support systems or any FDA Class 3 medical devices or medical devices with a same or similar classification in a foreign jurisdiction or any devices intended for implantation in the human body. Should Buyer purchase or use ON Semiconductor products for any such unintended or unauthorized application, Buyer shall indemnify and hold ON Semiconductor and its officers, employees, subsidiaries, affiliates, and distributors harmless against all claims, costs, damages, and expenses, and reasonable attorney fees arising out of, directly or indirectly, any claim of personal injury or death associated with such unintended or unauthorized use, even if such claim alleges that ON Semiconductor was negligent regarding the design or manufacture of the part. ON Semiconductor is an Equal Opportunity/Affirmative Action Employer. This literature is subject to all applicable copyright laws and is not for resale in any manner.

PUBLICATION ORDERING INFORMATION

LITERATURE FULFILLMENT:

Literature Distribution Center for ON Semiconductor
19521 E. 32nd Pkwy, Aurora, Colorado 80011 USA
Phone: 303-675-2175 or 800-344-3860 Toll Free USA/Canada
Fax: 303-675-2176 or 800-344-3867 Toll Free USA/Canada
Email: orderlit@onsemi.com

N. American Technical Support: 800-282-9855 Toll Free
USA/Canada
Europe, Middle East and Africa Technical Support:
Phone: 421 33 790 2910
Japan Customer Focus Center
Phone: 81-3-5817-1050

ON Semiconductor Website: www.onsemi.com
Order Literature: <http://www.onsemi.com/orderlit>
For additional information, please contact your local
Sales Representative