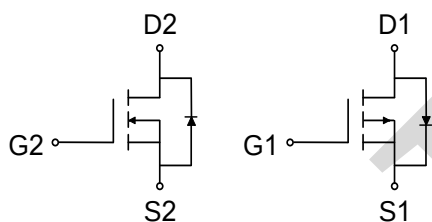
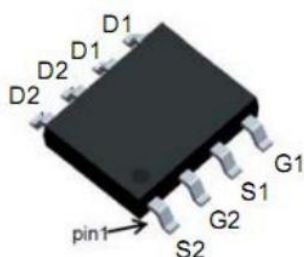


N+P Channel Advanced Trench MOSFET

MSR033X04P8

SOP8



Features

- Advance high cell density Trench technology
- Low $R_{DS(ON)}$ to minimize conductive loss
- Low Gate Charge for fast switching
- Low Thermal resistance
- 100% Avalanche tested
- 100% DVDS tested

Applications

- Motor driver appliances
- High power inverter system
- Adapter appliances

Maximum ratings, at $T_A = 25^\circ\text{C}$, unless otherwise specified

Symbol	Parameter		N-Channel	P-Channel	Unit
$V_{(BR)DSS}$	Drain-Source breakdown voltage		40	-40	V
V_{GS}	Gate-Source voltage		± 20	± 20	V
I_D	Continuous drain current	$T_C = 25^\circ\text{C}$	6	-5.5	A
		$T_C = 100^\circ\text{C}$	5	-4.5	A
I_{DM}	Pulse drain current tested	$T_C = 25^\circ\text{C}$	35	-27	A
EAS	Avalanche energy, single pulsed		15	18.15	mJ
PD	Maximum power dissipation	$T_C = 25^\circ\text{C}$	18	16	W
T_{STG}, T_J	Storage and Junction Temperature Range		-55 to 150	-55 to 150	$^\circ\text{C}$
$R_{\theta JC}$	Thermal Resistance, Junction-to-Case		6.9	50	$^\circ\text{C/W}$

N-MOS Electrical Characteristics (TC = 25°C, unless otherwise specified)

Symbol	Parameter	Condition	Min.	Typ.	Max.	Unit
V(BR)DSS	Drain-Source Breakdown Voltage	V _{GS} =0V, I _D =250μA	40	--	--	V
I _{DSS}	Zero Gate Voltage Drain Current	V _{DS} =40V, V _{GS} =0V	--	--	1	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	1.75	2.2	V
R _{DS(on)}	Drain-Source On-State Resistance	V _{GS} =10V, I _D =6A	--	24	30	mΩ
		V _{GS} =4.5V, I _D =5A	--	30	40	mΩ
V _{SD}	Forward on voltage	I _S =10A, V _{GS} =0V	--	--	1.3	V

Dynamic Parameters

C _{iss}	Input Capacitance	V _{DS} =20V, V _{GS} =0 V , f=1MHz	--	419	--	pF
C _{oss}	Output Capacitance		--	40	--	pF
C _{rss}	Reverse Transfer Capacitance		--	33	--	pF

Switching Parameters

Q _g	Total Gate Charge	V _{DS} =20V, I _D =5A , V _{GS} =10V	--	10	--	nC
Q _{gs}	Gate-Source Charge		--	1.3	--	nC
Q _{gd}	Gate-Drain Charge		--	2	--	nC
T _{d(on)}	Turn-on Delay Time	V _{DD} =10V V _{GS} =10V I _D =1A R _G =3.3Ω	--	4.1	--	ns
T _r	Turn-on Rise Time		--	3.4	--	ns
T _{d(off)}	Turn-Off Delay Time		--	15.3	--	ns
T _f	Turn-Off Fall Time		--	3	--	ns
R _g	Gate Res istance	f=1MHz	--	15	--	Ω

P-MOS Electrical Characteristics (TC = 25°C, unless otherwise specified)

Symbol	Parameter	Condition	Min.	Typ.	Max.	Unit
V(BR)DSS	Drain-Source Breakdown Voltage	V _{GS} =0V, I _D =250μA	-40	--	--	V
I _{DSS}	Zero Gate Voltage Drain Current	V _{DS} =-40V, V _{GS} =0V	--	--	-1	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	-1.2	-1.7	-2.2	V
R _{DS(on)}	Drain-Source On-State Resistance	V _{GS} =-10V, I _D =-6A	--	50	60	mΩ
		V _{GS} =-4.5V, I _D =-5A	--	63	80	mΩ
V _{SD}	Forward on voltage	I _S =-10A, V _{GS} =0V	--	--	-1.3	V

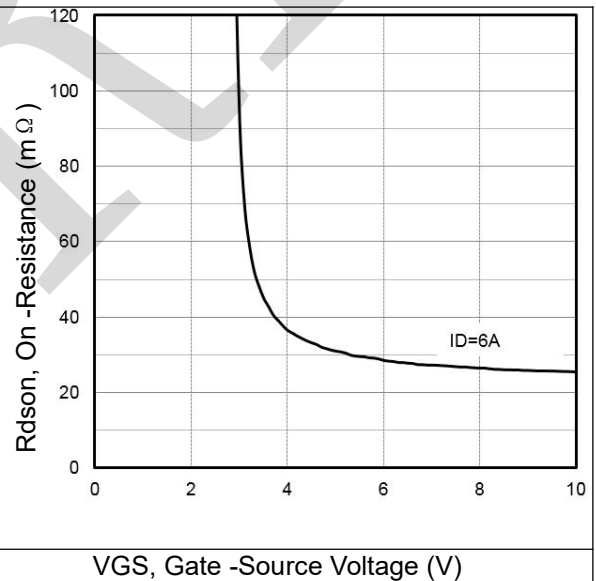
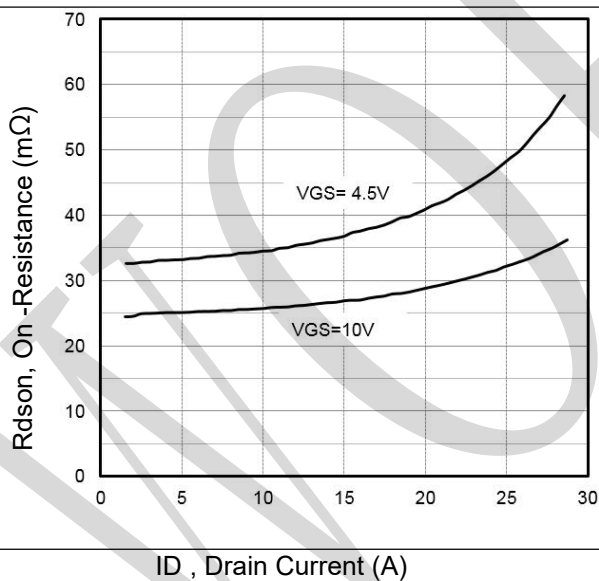
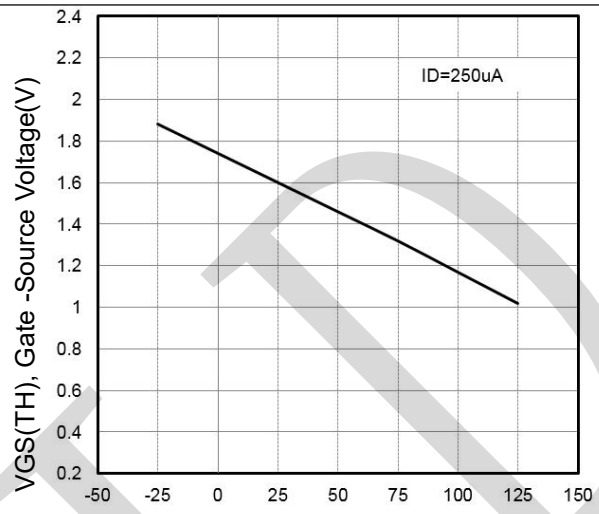
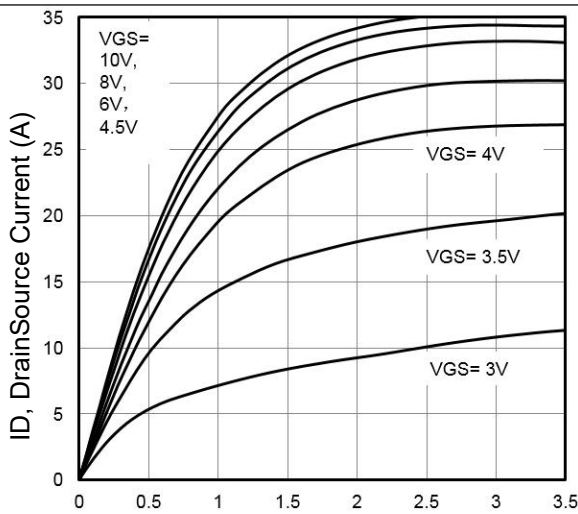
Dynamic Parameters

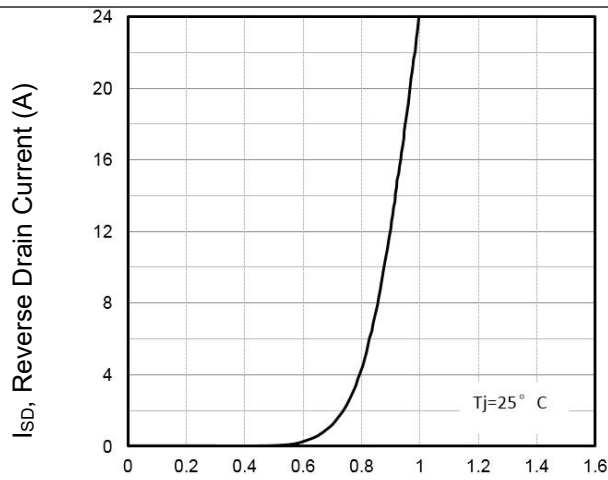
C _{iss}	Input Capacitance	V _{DS} =-20V, V _{GS} =0 V , f=1MHz	--	400	--	pF
C _{oss}	Output Capacitance		--	42	--	pF
C _{rss}	Reverse Transfer Capacitance		--	36	--	pF

Switching Parameters

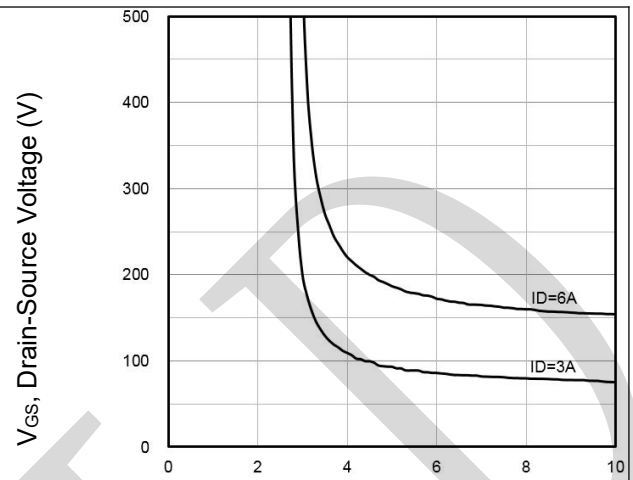
Q _g	Total Gate Charge	V _{DS} =-20V, I _D =-5A , V _{GS} =-10V	--	13.5	--	nC
Q _{gs}	Gate-Source Charge		--	1.7	--	nC
Q _{gd}	Gate-Drain Charge		--	3.7	--	nC
T _{d(on)}	Turn-on Delay Time	V _{DD} =-20V V _{GS} =-10V I _D =-1A R _G =3.3Ω	--	7.4	--	ns
T _r	Turn-on Rise Time		--	6.6	--	ns
T _{d(off)}	Turn-Off Delay Time		--	25	--	ns
T _f	Turn-Off Fall Time		--	11.3	--	ns
R _g	Gate Res istance	f=1MHz	--	20	--	Ω

N-Channel Typical Characteristics

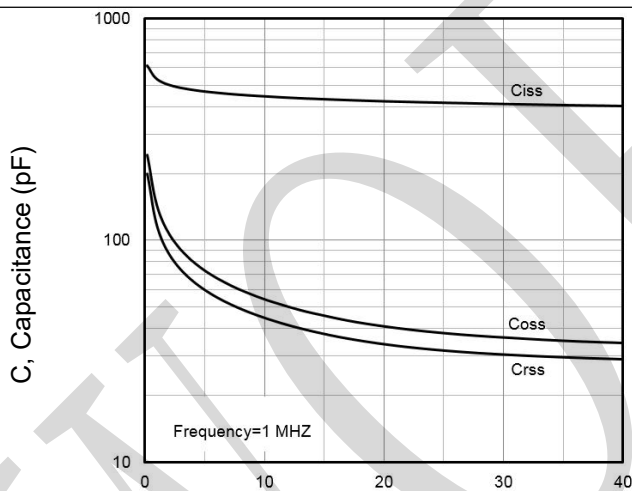




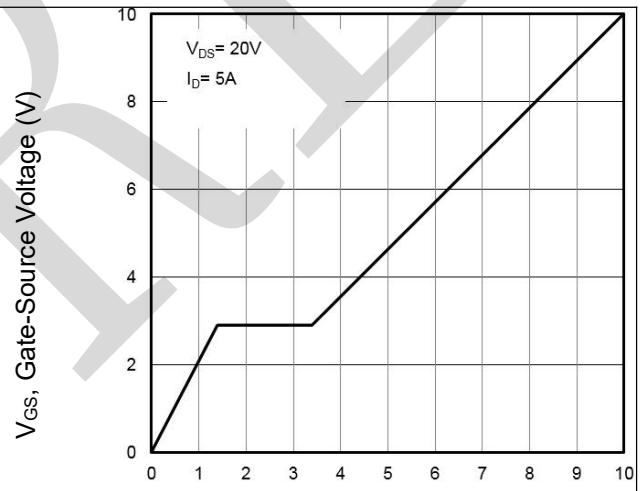
V_{SD} , Source-Drain Voltage (V)
Fig5. Source-Drain Diode Forward



V_{GS} , Gate-Source Voltage (V)
Fig6. Drain-Source Voltage vs Gate-Source Voltage

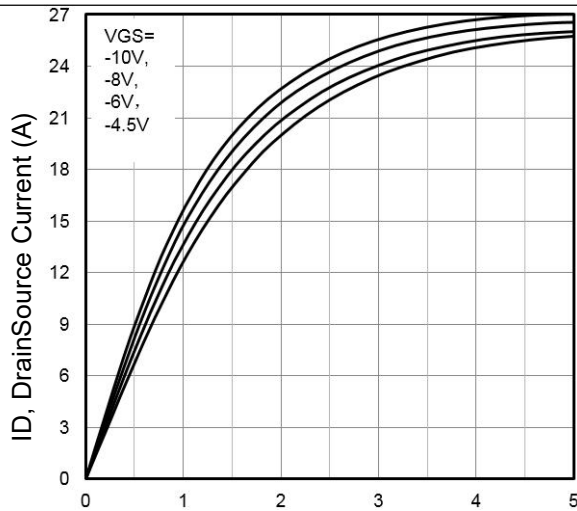


V_{DS} , Drain-Source Voltage (V)
Fig7. Typical Capacitance Vs. Drain-Source Voltage



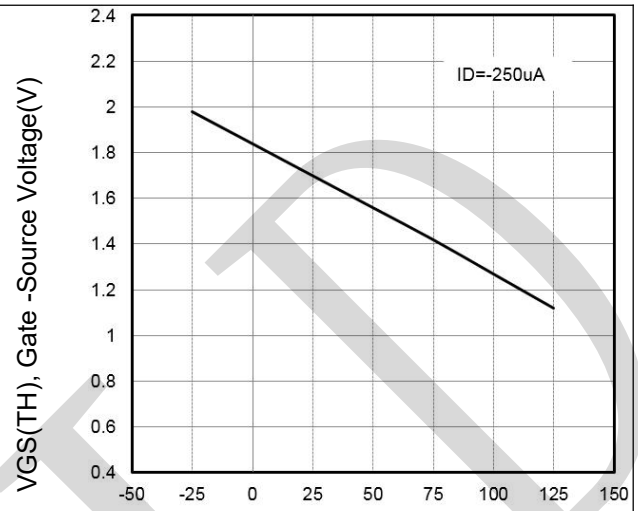
Q_g - Total Gate Charge (nC)
Fig8. Typical Gate Charge Vs. Gate-Source Voltage

P-Channel Typical Characteristics



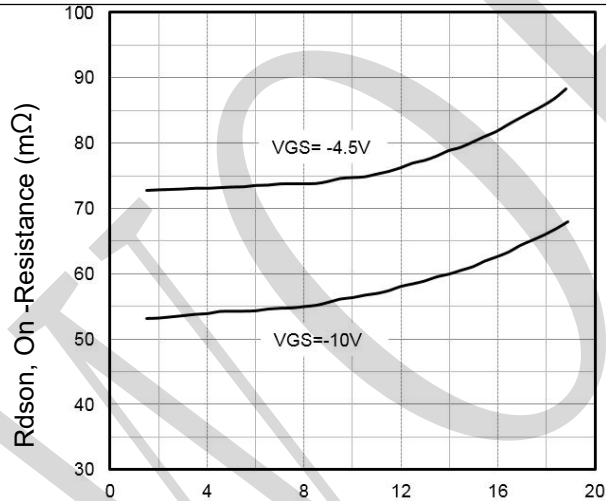
VDS, Drain Source Voltage (V)

Fig1. Typical Output Characteristics



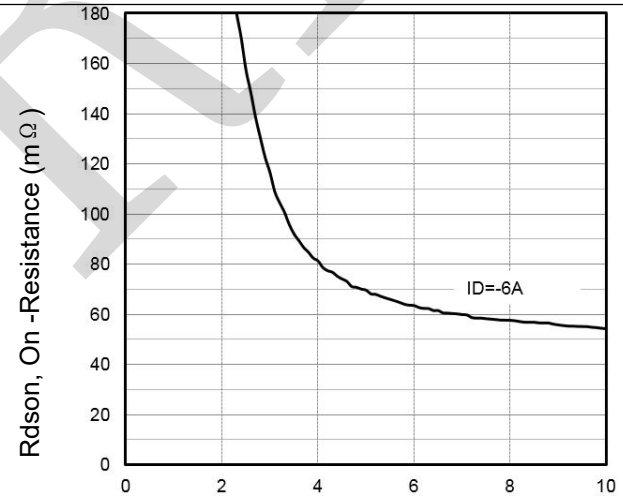
Tj - Junction Temperature (° C)

Fig2. Normalized Threshold Voltage Vs. Temperature



ID, Drain Current (A)

Fig3. On-Resistance vs. Drain Current and Gate Voltage



VGS, Gate -Source Voltage (V)

Fig 4. On-Resistance vs. Gate Source Voltage

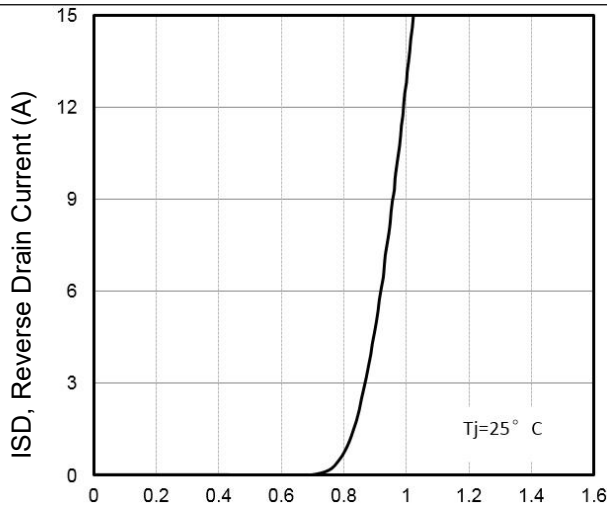


Fig5. Typical Source-Drain Diode Forward Voltage

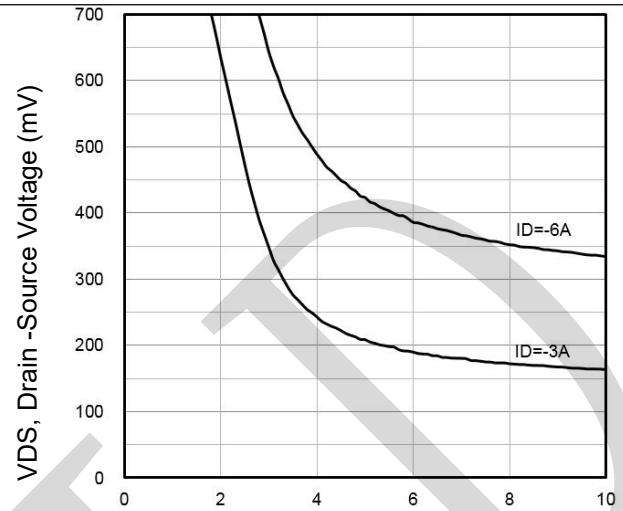


Fig6. Drain-Source Voltage vs Gate-Source Voltage

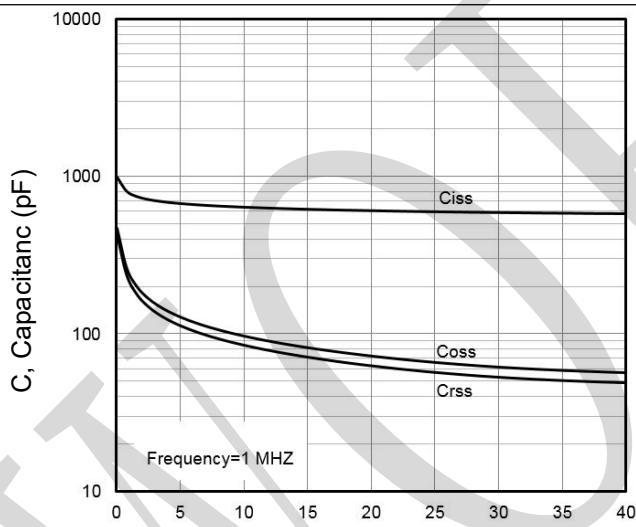


Fig7. Typical Capacitance Vs. Drain-Source Voltage

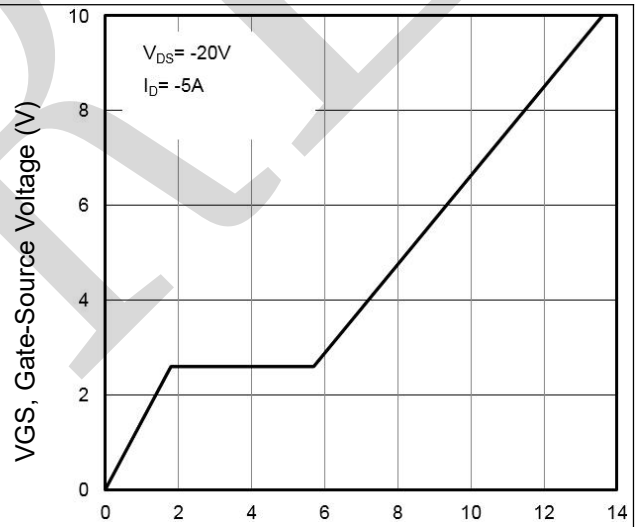
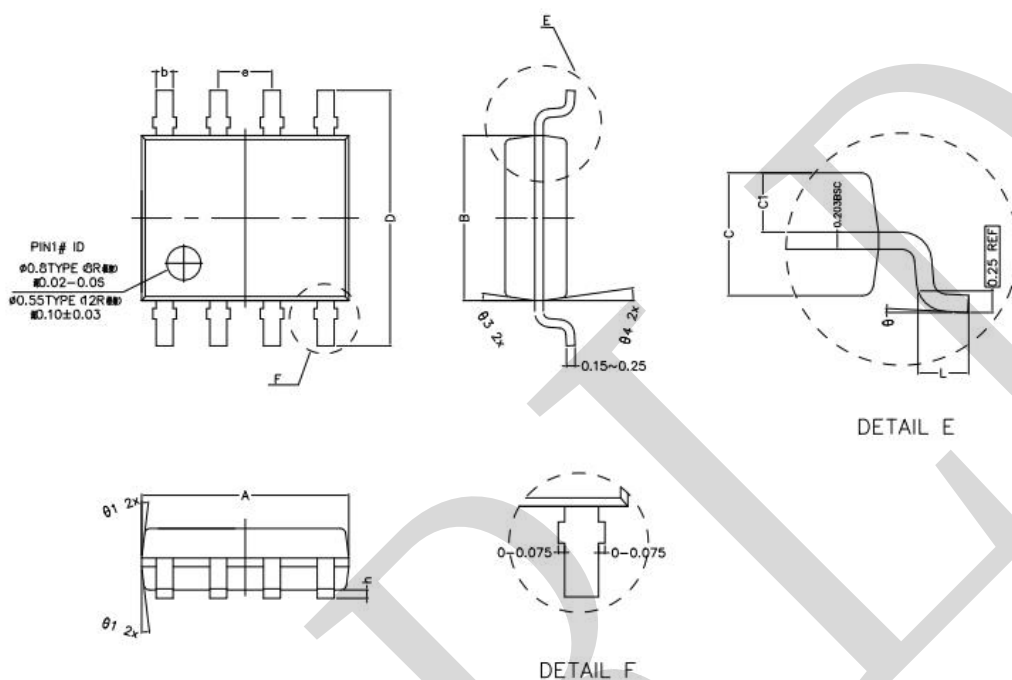


Fig8. Typical Gate Charge Vs. Gate-Source Voltage

Package Dimensions

SOP8



COMMON DIMENSIONS
(UNITS OF MEASURE IS mm)

	MIN	NORMAL	MAX
A	4.70	4.90	5.10
B	3.80	3.95	4.10
C	1.35	1.45	1.55
C1	0.65	0.70	0.75
D	5.80	6.05	6.30
L	0.40	0.60	0.80
b	0.30	0.40	0.50
h	0.05	0.15	0.25
e	1.27TYPE		
θ1	7°TYPE(8R)		12°TYPE(12R)
θ2	7°TYPE(8R)		10°TYPE(12R)
θ3	8°TYPE(8R)		12°TYPE(12R)
θ4	8°TYPE(8R)		10°TYPE(12R)
θ	0° ~ 8°		