N- and P-Channel 20V (D-S) MOSFET

GENERAL DESCRIPTION

The ME3587 is the N- and P-Channel logic enhancement mode power field effect transistors are produced using high cell density , DMOS trench technology. This high density process is especially tailored to minimize on-state resistance. These devices are particularly suited for low voltage application such as cellular phone and notebook computer power management and other battery powered circuits where low in-line power loss are needed in a very small outline surface mount package.

FEATURES

- $R_{DS(ON)}$ ≦45mΩ@V_{GS}=4.5V (N-Ch)
- $R_{DS(ON)}$ ≦68mΩ@V_{GS}=2.5V (N-Ch)
- $R_{DS(ON)}$ ≦120mΩ@V_{GS}=1.8V (N-Ch)
- $R_{DS(ON)}$ ≦110mΩ@V_{GS}=-4.5V (P-Ch)
- $R_{DS(ON)}$≦130mΩ@VGS=-2.5V (P-Ch)
- $R_{DS(ON)}$ ≦170mΩ@VGS=-1.8V (P-Ch)
- Super high density cell design for extremely low $R_{DS(ON)}$
- Exceptional on-resistance and maximum DC current capability

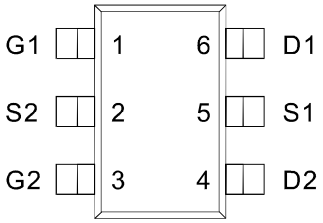
APPLICATIONS

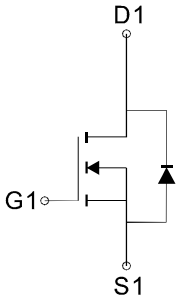
- Power Management in Note book
- Portable Equipment
- Battery Powered System
- Load Switch
- DSC
- LCD Display inverter

PIN CONFIGURATION

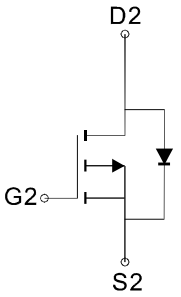
(TSOP-6)

Top View





N-Channel MOSFET



P-Channel MOSFET

Ordering Information: ME3587 (Pb-free) ME3587-G

(Green product-Halogen free)

Absolute Maximum Ratings (T_A=25℃ Unless Otherwise Noted)

Parameter		Symbol	N-channel Maximum Ratings	P-channel Maximum Ratings	Unit
Drain-Source Voltage		V_{DS}	20	-20	V
Gate-Source Voltage		V_{GS}	±8	±8	V
Continuous Drain Current *	T_A=25℃	I_D	4.6	-3.1	A
	T_A=70℃		3.2	-2.5	
Pulsed Drain Current		I_{DM}	16	-10	A
Maximum Power Dissipation	T_A=25℃	P_D	1.18	1.18	W
	T_A=70℃		0.7	0.7	
Operating Junction Temperature		T_J	-55 to 150	-55 to 150	℃
Thermal Resistance-Junction to Ambient*		$R_{\theta JA}$	150	175	℃/W

* The device mounted on 1in^2 FR4 board with 2 oz copper

N- and P-Channel 20V (D-S) MOSFET

N-Channel Mosfet Electrical Characteristics (T_A =25℃ Unless Otherwise Specified)

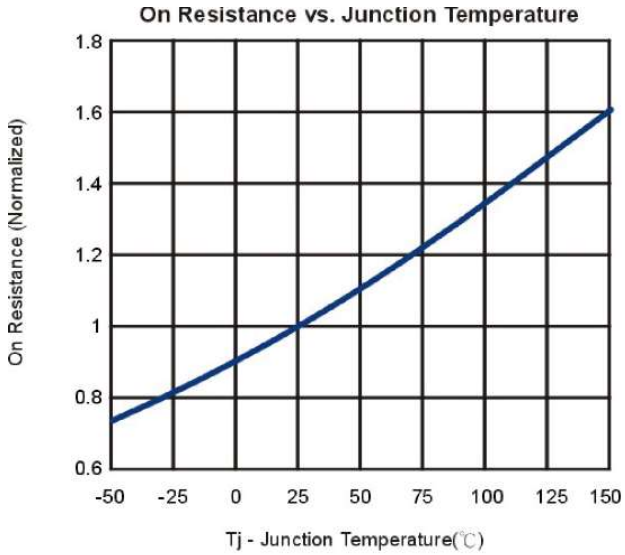
Symbol	Parameter	Limit	Min	Typ	Max	Unit
STATIC						
$V_{(BR)DSS}$	Drain-Source Breakdown Voltage	V_{GS}=0V, I_D=250μA	20			V
$V_{GS(th)}$	Gate Threshold Voltage	V_{DS}=V_{GS}, I_D=250μA	0.5		1.2	V
I_{GSS}	Gate Leakage Current	V_{DS}=0V, V_{GS}=±8V			±100	nA
I_{DSS}	Zero Gate Voltage Drain Current	V_{DS}=20V, V_{GS}=0V			1	μA
$R_{DS(ON)}$	Drain-Source On-Resistance [a]	V_{GS}=4.5V, I_D= 3.4A		37	45	mΩ
		V_{GS}=2.5V, I_D= 3A		52	68	
		V_{GS}=1.8V, I_D= 2A		92	120	
V_{SD}	Diode Forward Voltage	I_S=1A, V_{GS}=0V		0.7		V
DYNAMIC						
Qg	Total Gate Charge	V_{DS}=15V, V_{GS}=4.5V, I_D=3.4A		4.4		nC
Qgs	Gate-Source Charge			1.6		
Qgd	Gate-Drain Charge			0.8		
Rg	Gate resistance	V_{DS}=0V, V_{GS}=0V, f=1MHz		1.2		Ω
Ciss	Input Capacitance	V_{DS}=15V, V_{GS}=0V,f=1MHz		340		pF
Coss	Output Capacitance			50		
Crss	Reverse Transfer Capacitance			15		
$t_{d(on)}$	Turn-On Delay Time	V_{DS}=10V, R_L =10Ω R_{GEN}=3Ω, V_{GS}=5V		11		ns
t_r	Turn-On Rise Time			17		
$t_{d(off)}$	Turn-Off Delay Time			30		
t_f	Turn-Off Fall time			3		

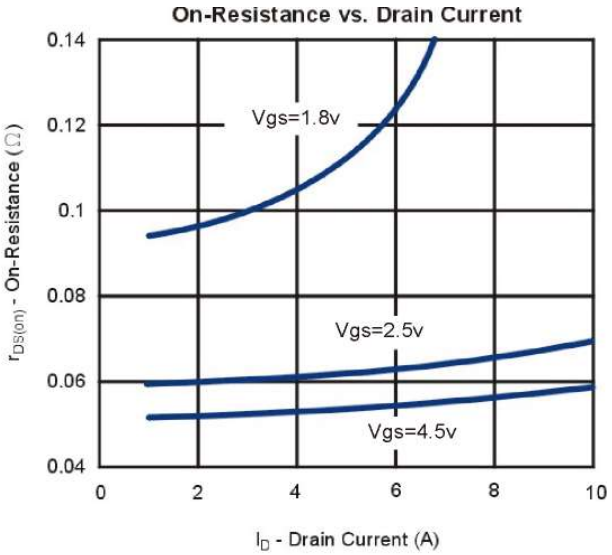
Notes: a. Pulse test; pulse width ≦ 300us, duty cycle≦ 2%

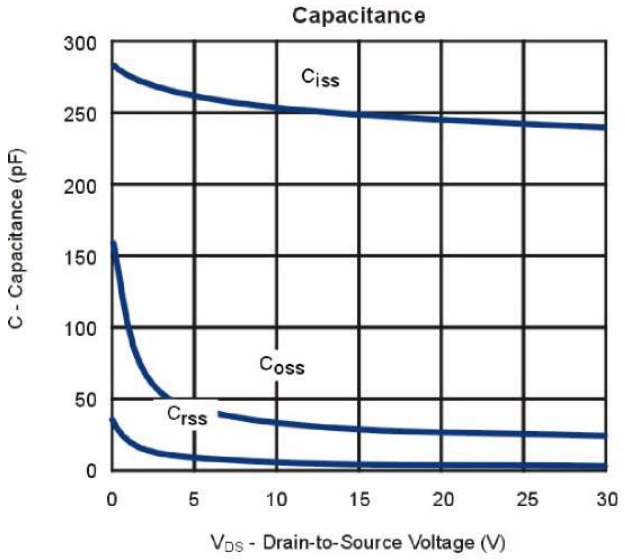
b. Matsuki Electric/ Force mos reserves the right to improve product design, functions and reliability without notice.

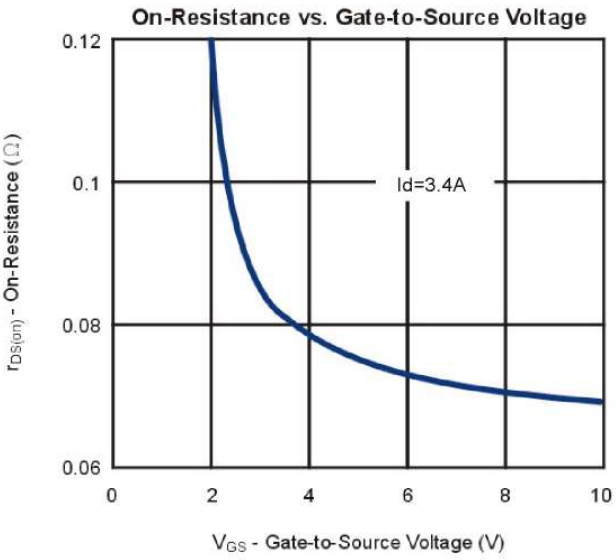
Typical Characteristics (T_J =25℃ Noted) N-Channel

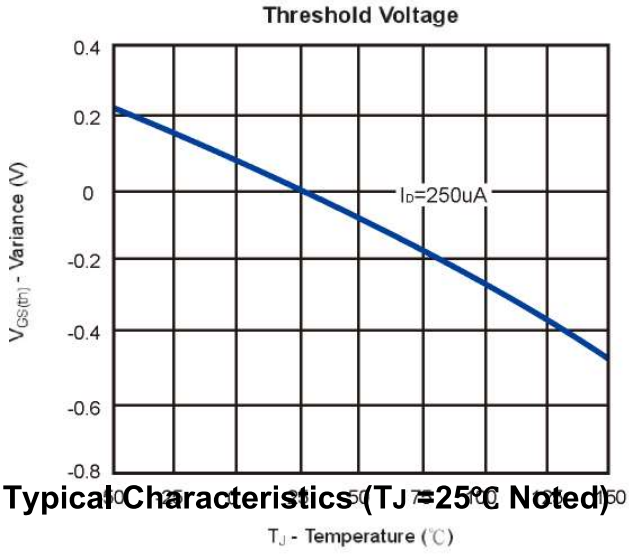
N- and P-Channel 20V (D-S) MOSFET

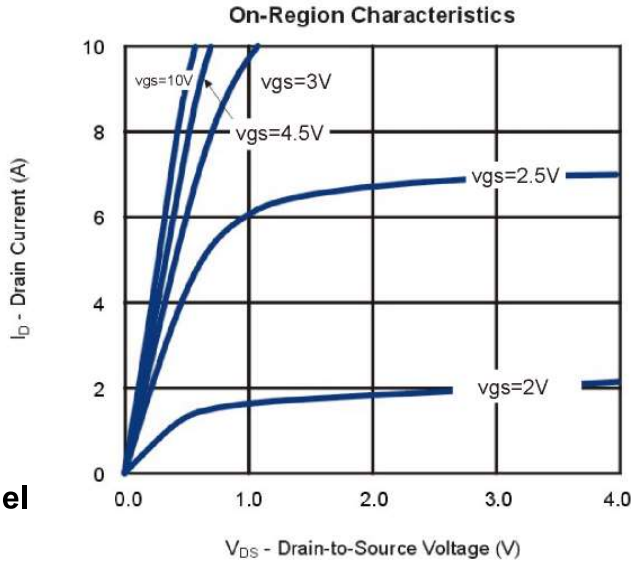








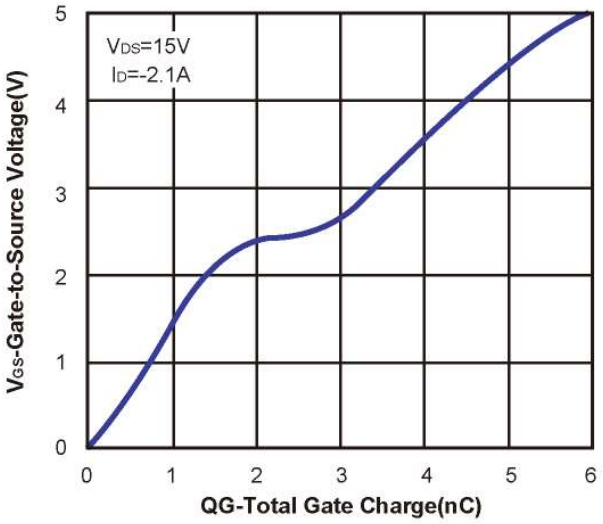




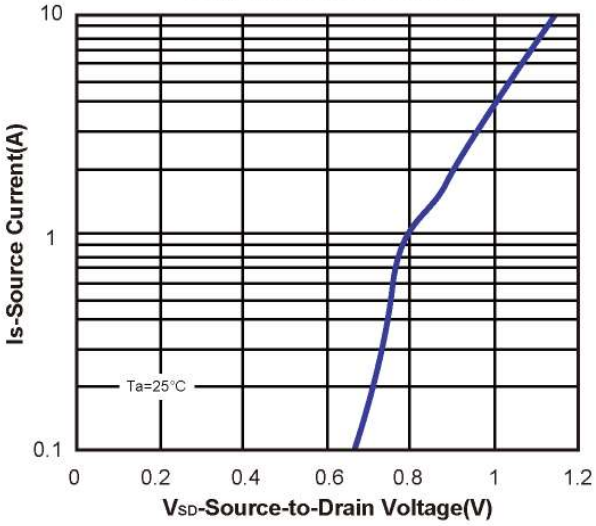
Typical Characteristics (TJ=25°C Noted) N-Channel

N- and P-Channel 20V (D-S) MOSFET

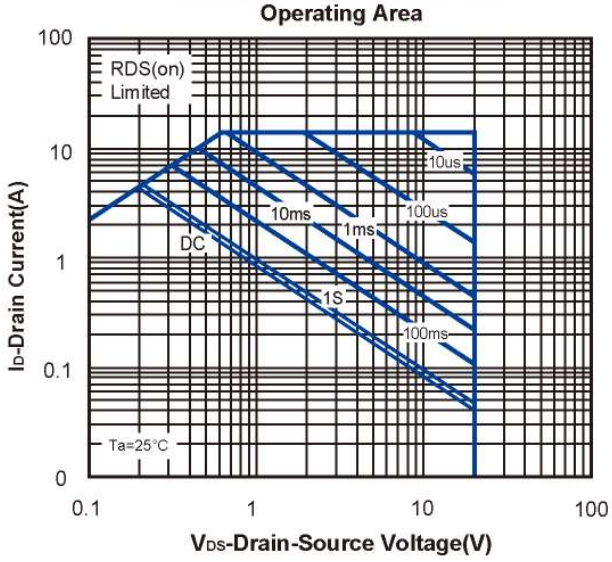
Gate Charge



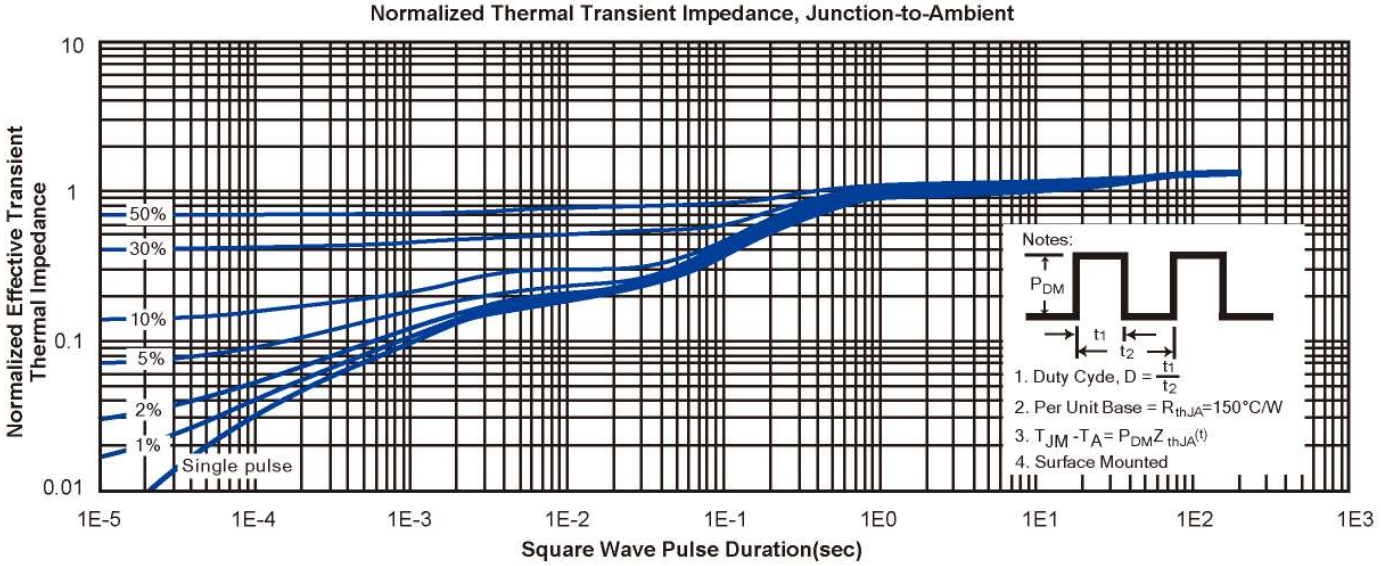
Body-diode characteristics



Maximum Forward Biased Safe Operating Area



Normalized Thermal Transient Impedance, Junction-to-Ambient



N- and P-Channel 20V (D-S) MOSFET

P-Channel Electrical Characteristics (T_A =25℃ Unless Otherwise Specified)

Symbol	Parameter	Limit	Min	Typ	Max	Unit
STATIC						
$V_{(BR)DSS}$	Drain-Source Breakdown Voltage	V_{GS}=0V, I_D=-250μA	-20			V
$V_{GS(th)}$	Gate Threshold Voltage	V_{DS}=V_{GS}, I_D=-250μA	-0.4		-1	V
I_{GSS}	Gate Leakage Current	V_{DS}=0V, V_{GS}=±8V			±100	nA
I_{DSS}	Zero Gate Voltage Drain Current	V_{DS}=-20V, V_{GS}=0V			-1	μA
$R_{DS(ON)}$	Drain-Source On-Resistance [a]	V_{GS}=-4.5V, I_D= -2.8A		85	110	mΩ
		V_{GS}=-2.5V, I_D= -2A		110	130	
		V_{GS}=-1.8V, I_D= -1A		130	170	
V_{SD}	Diode Forward Voltage	I_S=-1A, V_{GS}=0V		-0.7	-1.4	V
DYNAMIC						
Qg	Total Gate Charge	V_{DS}=-15V, V_{GS}=-4.5V, I_D=-2.8A		5		nC
Qgs	Gate-Source Charge			1.5		
Qgd	Gate-Drain Charge			0.9		
Ciss	Input Capacitance	V_{DS}=-15V, V_{GS}=0V,f=1MHz		480		pF
Coss	Output Capacitance			46		
Crss	Reverse Transfer Capacitance			10		
$t_{d(on)}$	Turn-On Delay Time	V_{DS}=-6V, R_L =6Ω R_{GEN}=6Ω, V_{GS}=-4.5V		50		ns
t_r	Turn-On Rise Time			30		
$t_{d(off)}$	Turn-Off Delay Time			40		
t_f	Turn-Off Fall time			11		

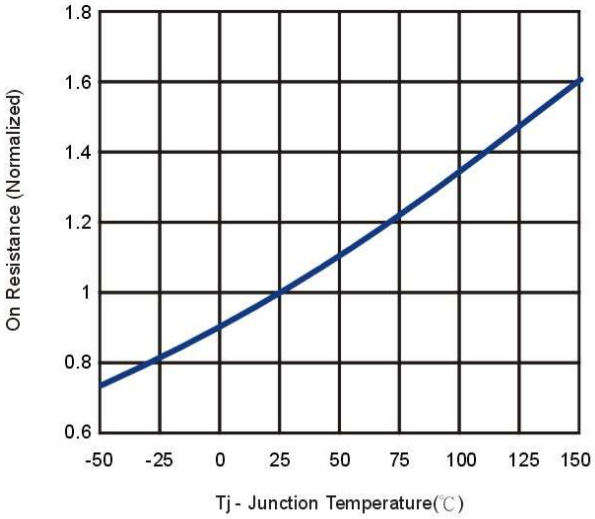
Notes: a. Pulse test; pulse width ≦ 300us, duty cycle≦ 2%

b. Matsuki Electric/ Force mos reserves the right to improve product design, functions and reliability without notice.

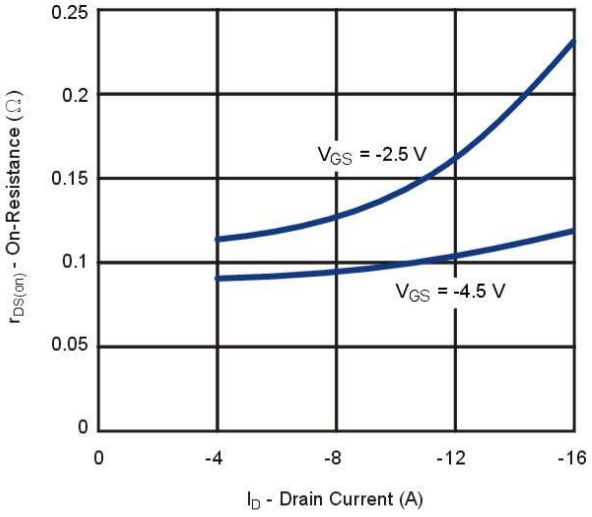
N- and P-Channel 20V (D-S) MOSFET

Typical Characteristics (T_J =25℃ Noted) P-Channel

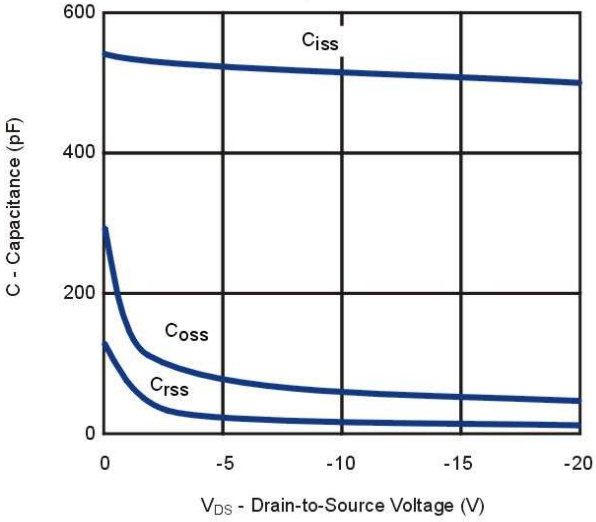
On Resistance vs. Junction Temperature



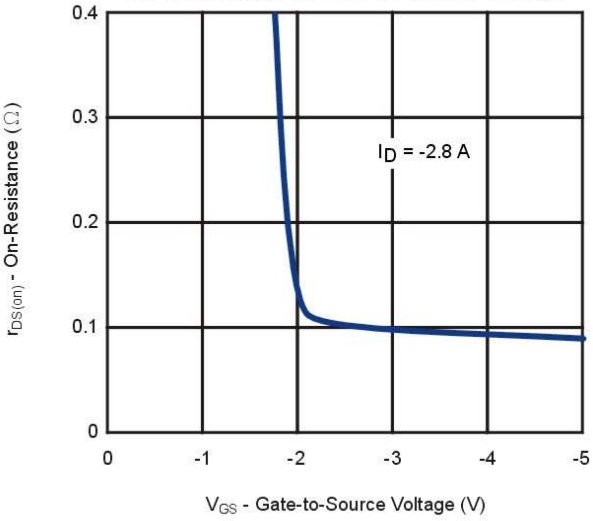
On-Resistance vs. Drain Current



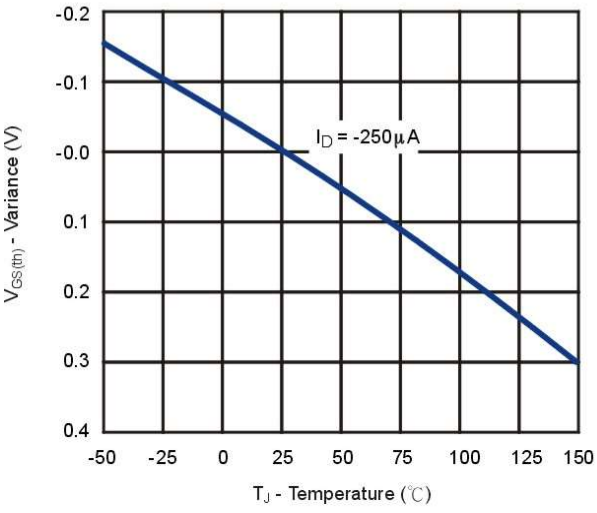
Capacitance



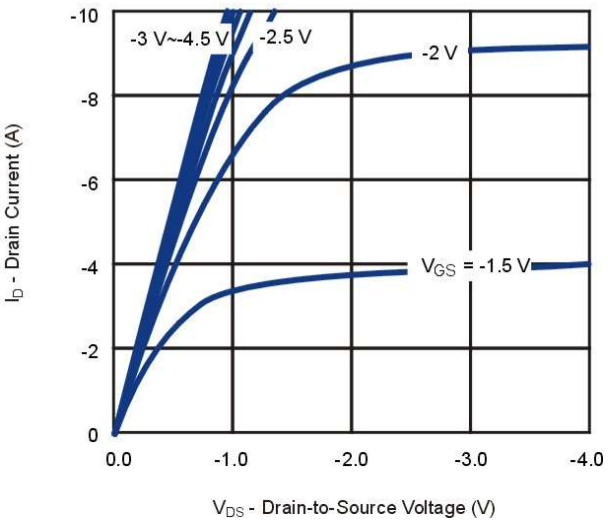
On-Resistance vs. Gate-to-Source Voltage



Threshold Voltage



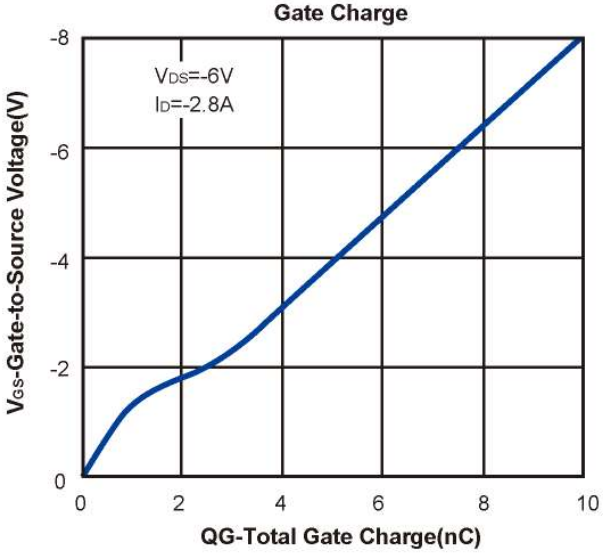
On-Region Characteristics



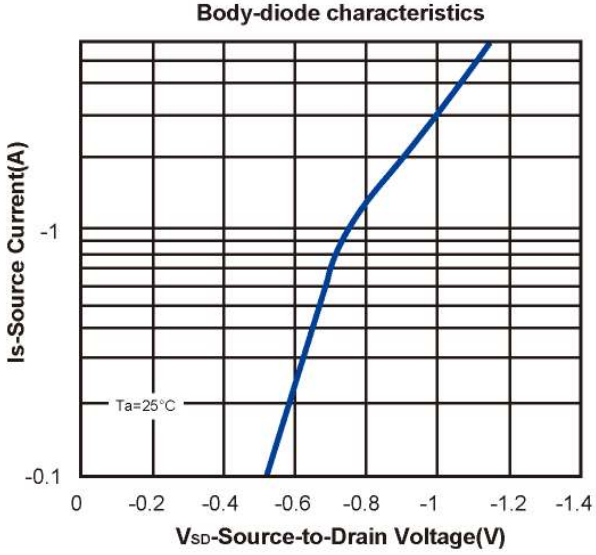
N- and P-Channel 20V (D-S) MOSFET

Typical Characteristics (T_J =25℃ Noted) P-Channel

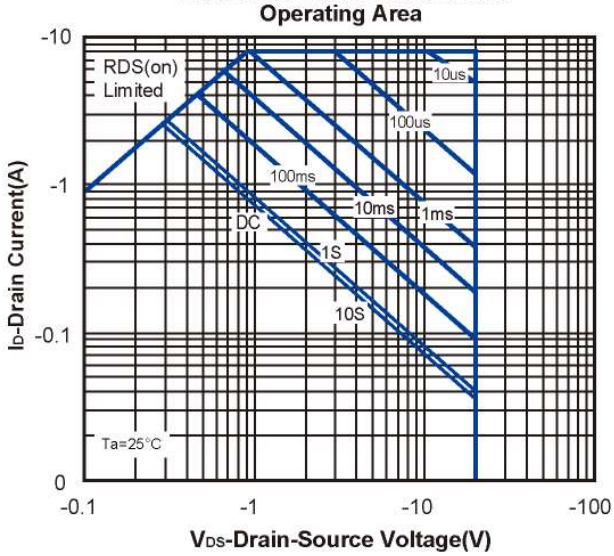
Gate Charge



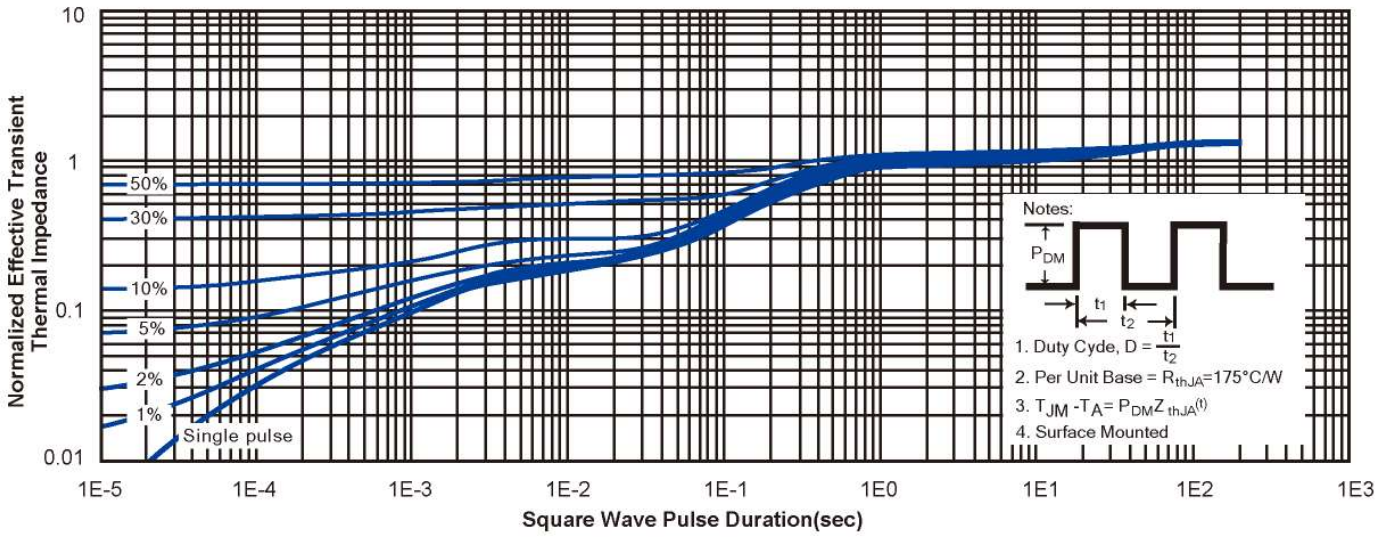
Body-diode characteristics



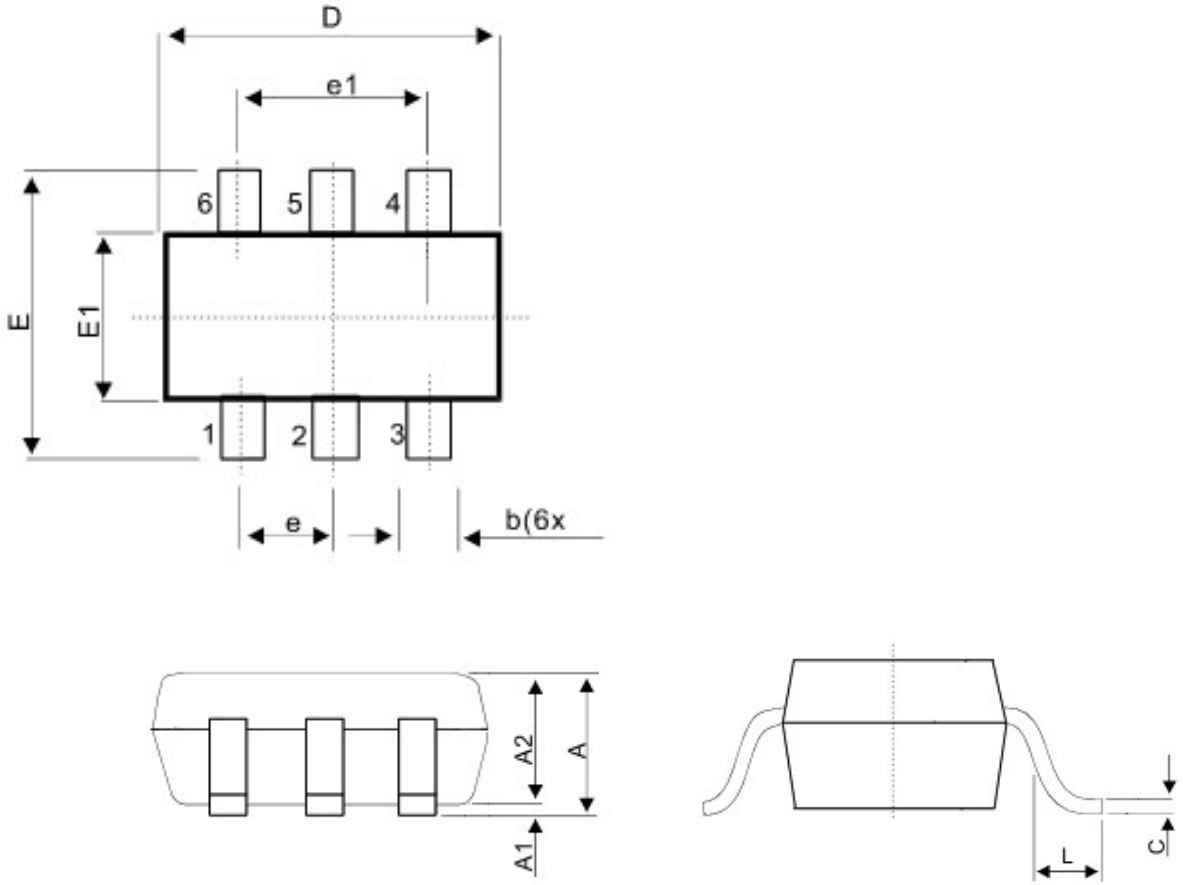
Maximum Forward Biased Safe Operating Area



Normalized Thermal Transient Impedance, Junction-to-Ambient



TSOP-6 Package Outline



SYMBOL	MILLIMETERS (mm)	
	MIN	MAX
A	0.90	1.20
A1	0.01	0.10
A2	0.90	1.15
b	0.25	0.50
C	0.10	0.20
D	2.80	3.10
E	2.60	3.00
E1	1.50	1.70
e	0.95 BSC	
e1	1.90 BSC	
L	0.30	0.60