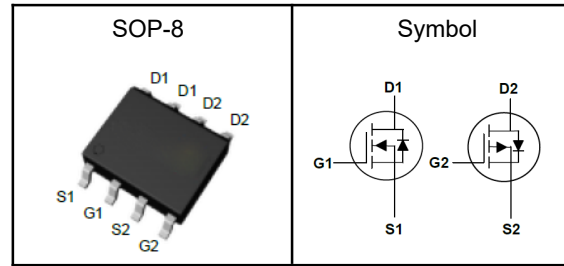


40V N+P-Channel MOSFET
Features

- High Speed Power Switching
- Reliable and Rugged
- ROHS Compliant
- 100% Avalanche Tested

Applications

- Power Management in Desktop Computer
- DC/DC Converters

Pin Description


	N-ch	P-ch	
V_{DSS}	40	-40	V
$R_{DS(ON)-Typ}$	16	30	m Ω
I_D	7.5	-5.5	A

Absolute Maximum Ratings ($T_A=25^{\circ}C$, Unless Otherwise Noted)

Symbol	Parameter	N-Ch	P-Ch	Unit
V_{DSS}	Drain-Source Voltage	40	-40	V
V_{GSS}	Gate-Source Voltage	± 20	± 20	V
T_J	Maximum Junction Temperature	-55 to 150		$^{\circ}C$
T_{STG}	Storage Temperature Range	-55 to 150		$^{\circ}C$
$I_{DM}^{①}$	Pulse Drain Current Tested	30	-22	A
I_D	Continuous Drain Current	7.5	-5.5	A
P_D	Maximum Power Dissipation	2	2	W
E_{AS}	Avalanche Energy, Single pulse	25	25	mJ

Thermal Characteristics

Symbol	Parameter	Rating	Unit
$R_{\theta JA}$	Thermal Resistance-Junction to Ambient	110	$^{\circ}C/W$

Note ① : Max. current is limited by bonding wire.

Note ② : UIS tested and pulse width are limited by maximum junction temperature 150 $^{\circ}C$.

Note ③ : Surface Mounted on 1in² FR-4 board with 1oz.



40V N+P-Channel MOSFET

N-ch Electrical Characteristics (T_J=25°C, Unless Otherwise Noted)

Symbol	Parameter	Test Conditions	Min	Typ	Max	Unit
Static Electrical Characteristics						
BV _{DSS}	Drain-Source Breakdown Voltage	V _{GS} =0V, I _D =250uA	40	---	---	V
I _{DSS}	Zero Gate Voltage Drain Current	V _{DS} =32V, V _{GS} =0V	---	---	1	uA
V _{GS(th)}	Gate Threshold Voltage	V _{DS} =V _{GS} , I _D =250uA	1.2	---	2.5	V
I _{GSS}	Gate Leakage Current	V _{GS} =±20V, V _{DS} =0V	---	---	±100	nA
R _{DS(ON)}	Drain-Source On-state Resistance	V _{GS} =10V, I _D =6A	---	16	21	mΩ
		V _{GS} =4.5V, I _D =5A	---	18	25	mΩ
Dynamic Characteristics ⑤						
R _g	Gate Resistance	V _{DS} =0V, V _{GS} =0V, f=1MHz	---	2.5	---	Ω
C _{iss}	Input Capacitance	V _{DS} =20V, V _{GS} =0V, Freq.=1MHz	---	815	---	pF
C _{oss}	Output Capacitance		---	95	---	
C _{rss}	Reverse Transfer Capacitance		---	60	---	
T _{d(on)}	Turn-on Delay Time	V _{DD} =20V, V _{GS} =10V, I _D =1A, R _G =6Ω	---	7.8	---	nS
T _r	Turn-on Rise Time		---	6.8	---	
T _{d(off)}	Turn-off Delay Time		---	22	---	
T _f	Turn-off Fall Time		---	4.9	---	
Q _g	Total Gate Charge	V _{DS} =20V, V _{GS} =10V, I _D =6A	---	15.7	---	nC
Q _{gs}	Gate-Source Charge		---	3.2	---	
Q _{gd}	Gate-Drain Charge		---	2.7	---	
Source-Drain Characteristics						
V _{SD}	Diode Forward Voltage	I _S =1A, V _{GS} =0V	---	---	1.1	V
t _{rr}	Reverse Recovery Time	I _F =6A, di/dt=100A/us	---	13	---	nS
Q _{rr}	Reverse Recovery Charge		---	8.7	---	nC

Note ④: Pulse test (pulse width≤300us, duty cycle≤2%).

Note ⑤: Guaranteed by design, not subject to production testing.



40V N+P-Channel MOSFET

P-ch Electrical Characteristics ($T_J=25^{\circ}\text{C}$, Unless Otherwise Noted)

Symbol	Parameter	Test Conditions	Min	Typ	Max	Unit
Static Electrical Characteristics						
BV_{DSS}	Drain-Source Breakdown Voltage	$V_{GS}=0V, I_D=-250\mu A$	-40	---	---	V
I_{DSS}	Zero Gate Voltage Drain Current	$V_{DS}=-32V, V_{GS}=0V$	---	---	-1	μA
$V_{GS(th)}$	Gate Threshold Voltage	$V_{DS}=V_{GS}, I_D=-250\mu A$	-1.2	---	-2.5	V
I_{GSS}	Gate Leakage Current	$V_{GS}=\pm 20V, V_{DS}=0V$	---	---	± 100	nA
$R_{DS(ON)}$	Drain-Source On-state Resistance	$V_{GS}=-10V, I_D=-5.5A$	---	30	38	m Ω
		$V_{GS}=-4.5V, I_D=-3.5A$	---	46	62	m Ω
Dynamic Characteristics^⑤						
R_g	Gate Resistance	$V_{DS}=0V, V_{GS}=0V, f=1MHz$	---	8	---	Ω
C_{iss}	Input Capacitance	$V_{DS}=-20V, V_{GS}=0V, Freq.=1MHz$	---	668	---	pF
C_{oss}	Output Capacitance		---	98	---	
C_{rss}	Reverse Transfer Capacitance		---	72	---	
$T_{d(on)}$	Turn-on Delay Time	$V_{DD}=-20V, V_{GS}=-10V, I_D=-1A, R_G=6\Omega$	---	8.7	---	nS
T_r	Turn-on Rise Time		---	7	---	
$T_{d(off)}$	Turn-off Delay Time		---	31	---	
T_f	Turn-off Fall Time		---	17	---	
Q_g	Total Gate Charge	$V_{DS}=-20V, V_{GS}=-10V, I_D=-5.5A$	---	15	---	nC
Q_{gs}	Gate-Source Charge		---	2.4	---	
Q_{gd}	Gate-Drain Charge		---	3.5	---	
Source-Drain Characteristics						
V_{SD}	Diode Forward Voltage	$I_S=-1A, V_{GS}=0V$	---	---	-1.1	V
t_{rr}	Reverse Recovery Time	$I_F=-5.5A, dI_F/dt=100A/\mu s$	---	15	---	nS
Q_{rr}	Reverse Recovery Charge		---	8	---	nC

Note ④: Pulse test (pulse width $\leq 300\mu s$, duty cycle $\leq 2\%$).

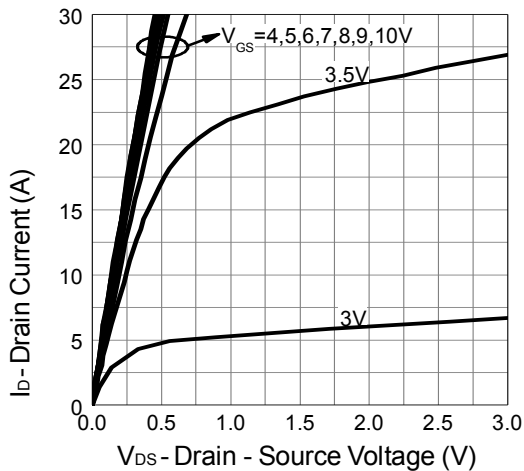
Note ⑤: Guaranteed by design, not subject to production testing.



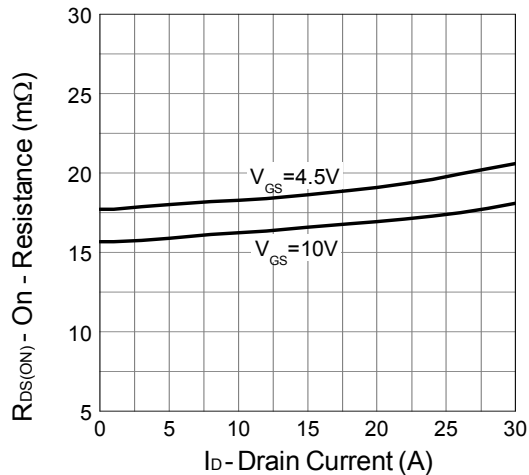
40V N+P-Channel MOSFET

N-ch Typical Characteristics

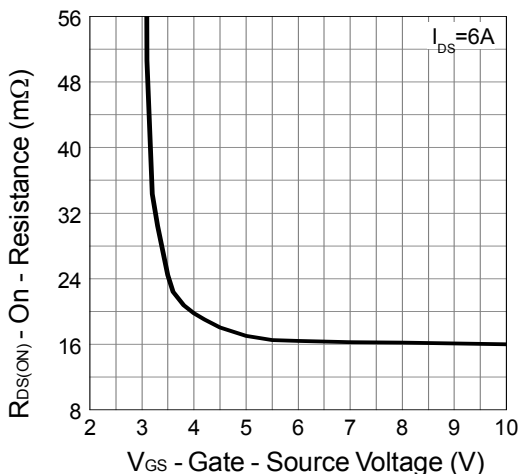
Output Characteristics



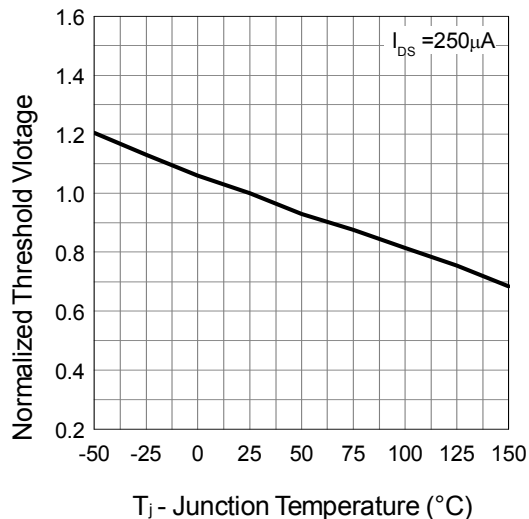
Drain-Source On Resistance



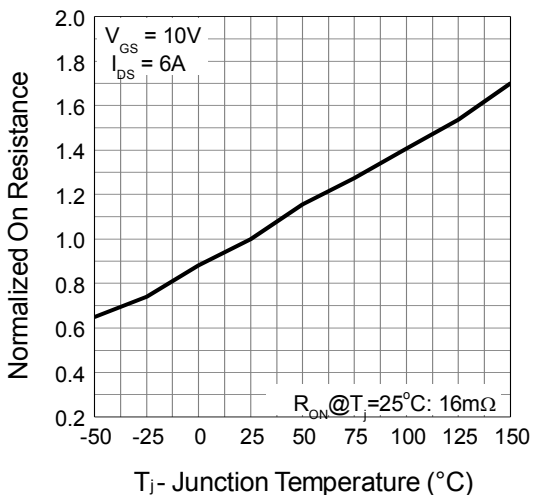
Gate-Source On Resistance



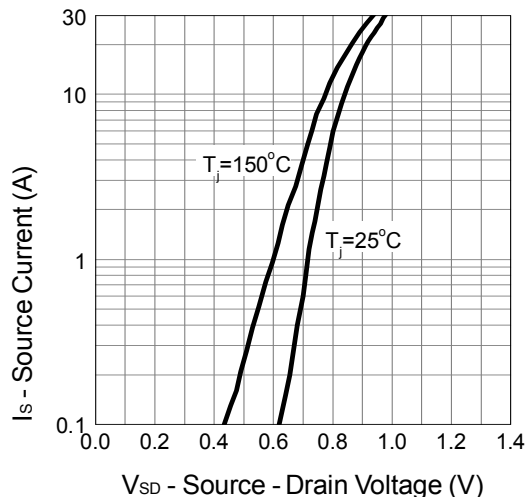
Gate Threshold Voltage



Drain-Source On Resistance



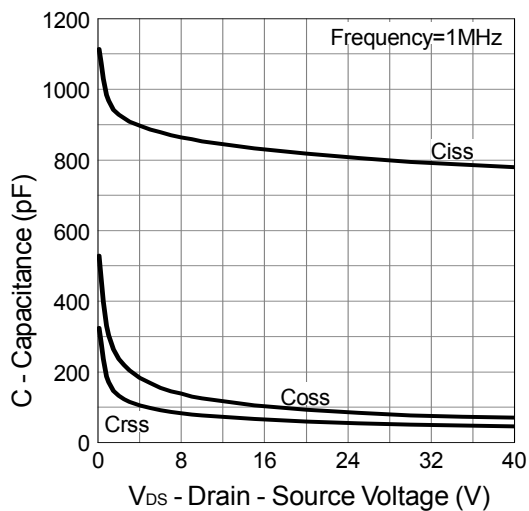
Source-Drain Diode Forward



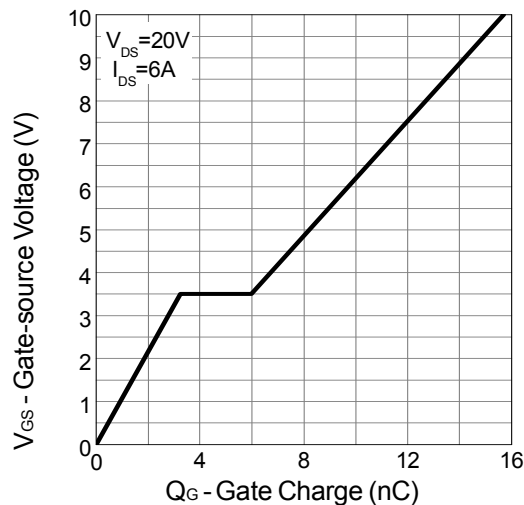


40V N+P-Channel MOSFET

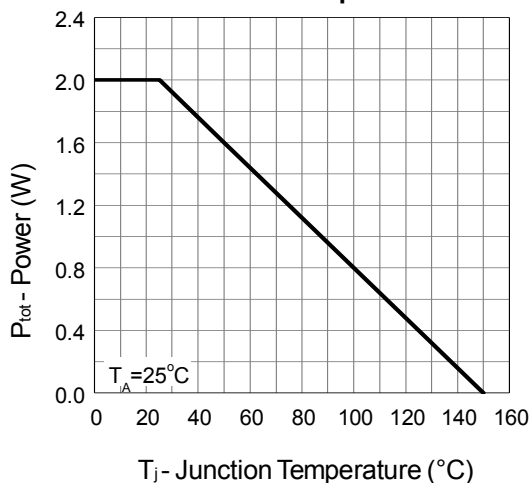
Capacitance



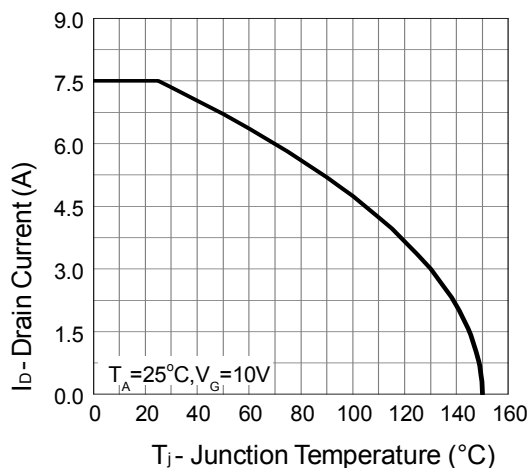
Gate Charge



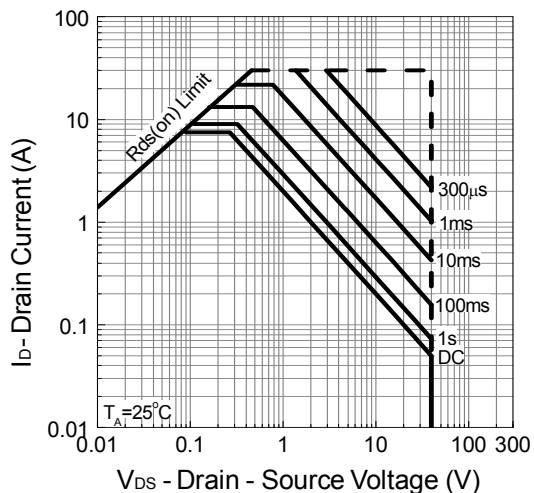
Power Dissipation



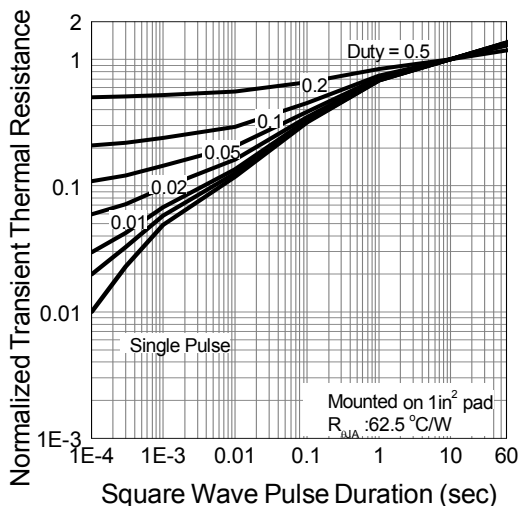
Drain Current

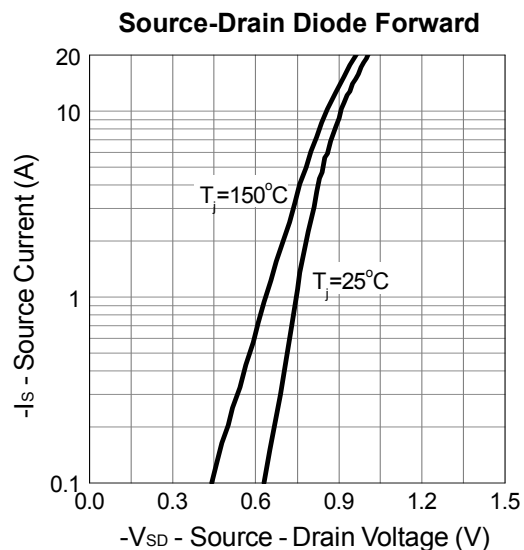
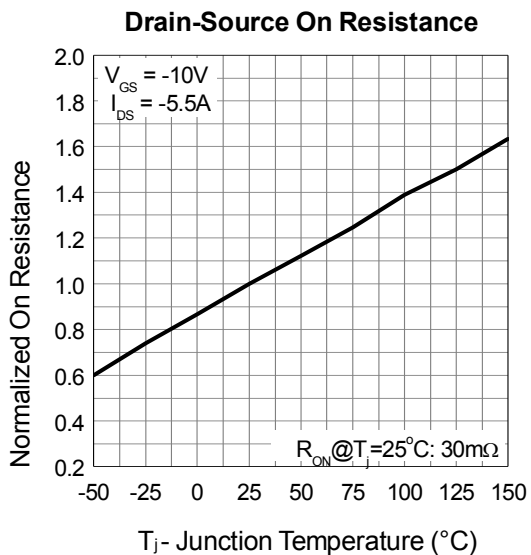
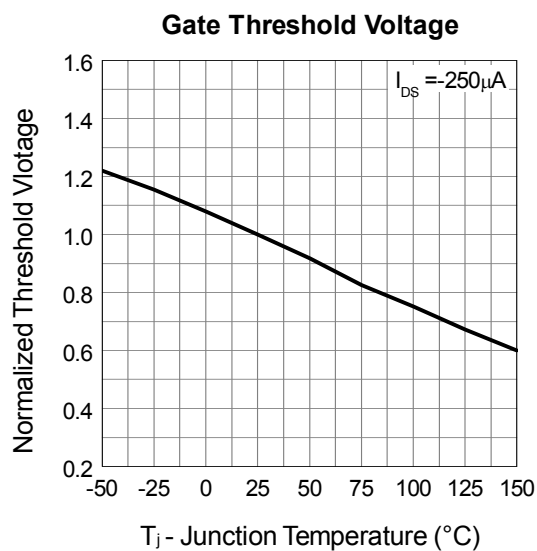
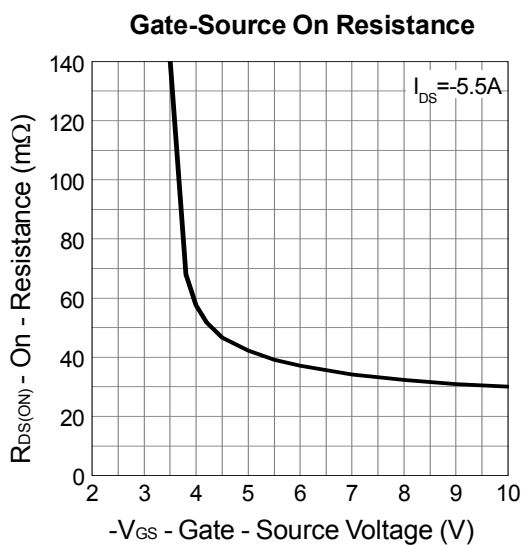
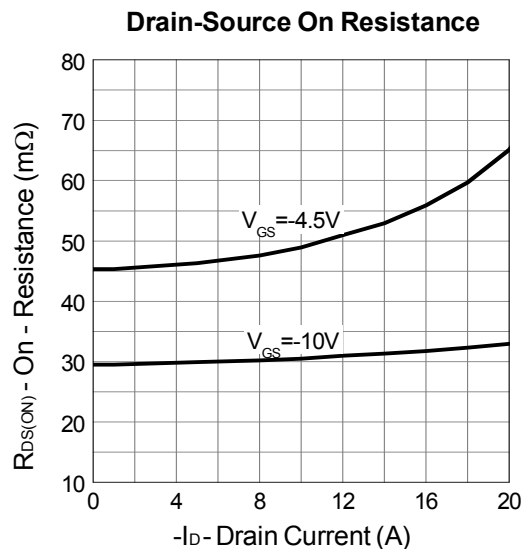
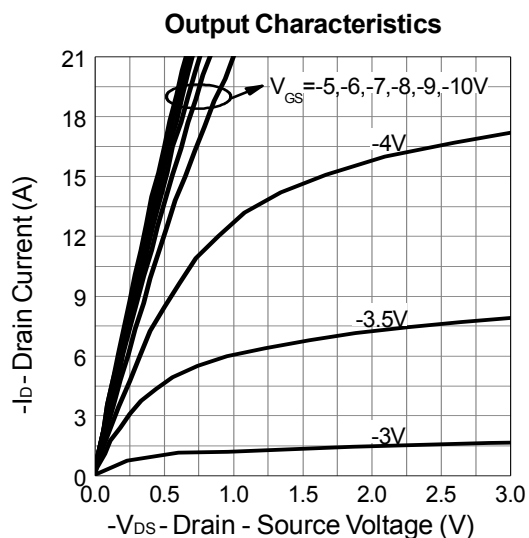


Safe Operation Area



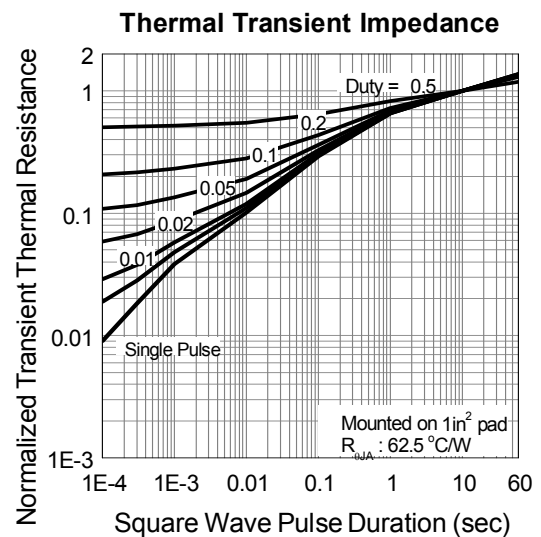
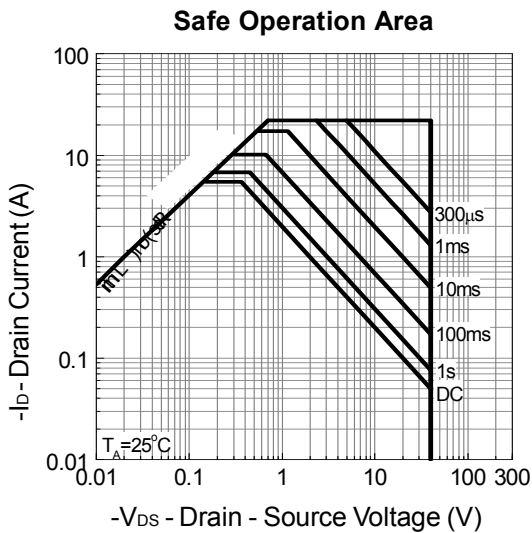
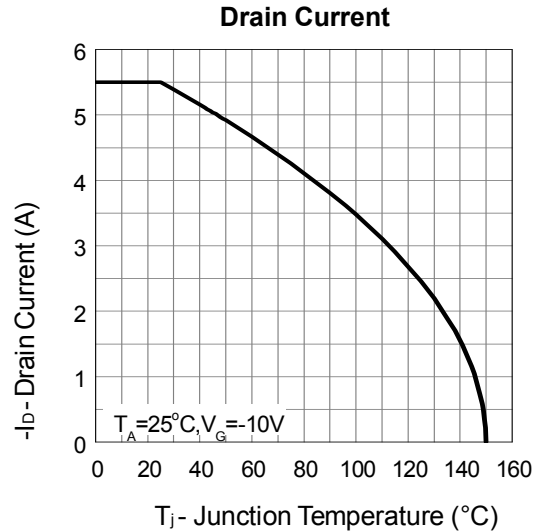
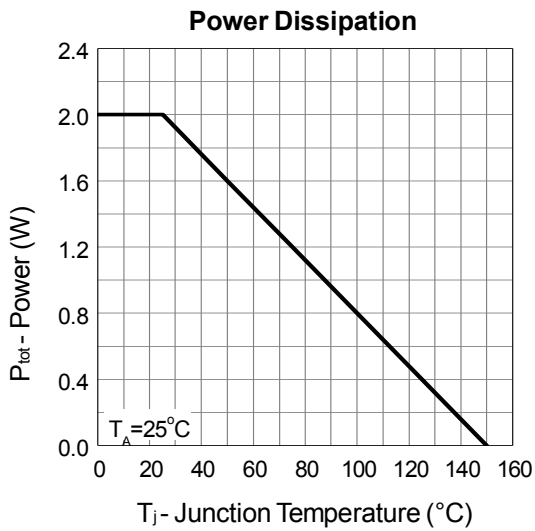
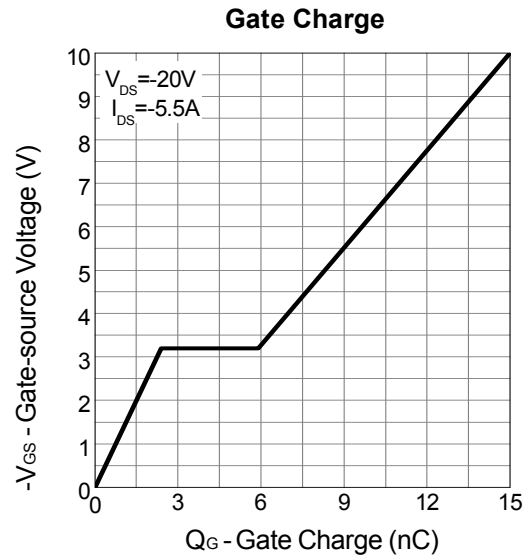
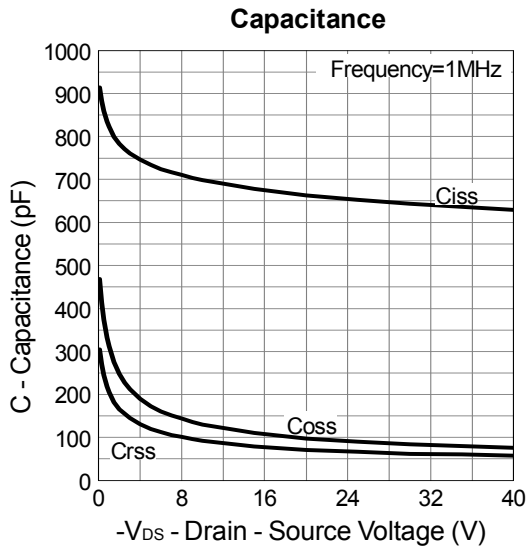
Thermal Transient Impedance

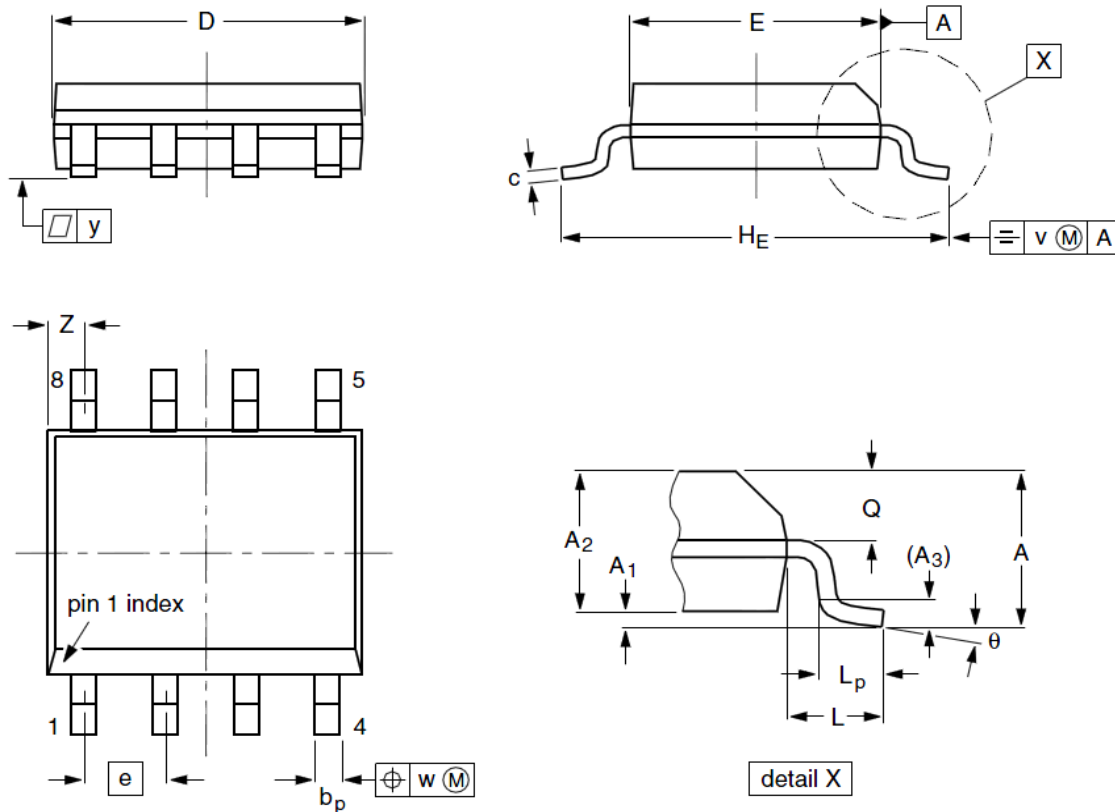


40V N+P-Channel MOSFET
P-ch Typical Characteristics




40V N+P-Channel MOSFET



40V N+P-Channel MOSFET
SOP-8 Package Outline Dimensions


Symbol	Dimensions (unit:mm)			Symbol	Dimensions (unit:mm)		
	Min	Typ	Max		Min	Typ	Max
A	1.35	1.55	1.75	A₁	0.10	0.18	0.25
A₂	1.25	1.45	1.65	A₃	--	0.25	--
b_p	0.36	0.42	0.51	c	0.19	0.22	0.25
D	4.70	4.92	5.10	E	3.80	3.90	4.00
e	--	1.27	--	H_E	5.80	6.00	6.20
L	--	1.05	--	L_p	0.40	0.68	1.00
Q	0.60	0.65	0.73	v	--	0.25	--
w	--	0.25	--	y	--	0.10	--
Z	0.30	0.50	0.70	θ	0°		8°