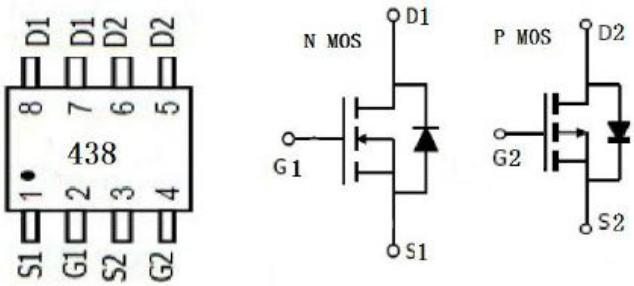
YPN 438S———40V 10A N&P-Channel Power MOSFET (2 IN 1)

Features

- Proprietary New Trench Technology
- Ultra-low Miller Charge
- N MOS RDS(ON),typ.=18mΩ@V_{GS}=10V
- P MOS RDS(ON),typ.=30mΩ@V_{GS}=10V
- Low Gate Charge Minimize Switching Loss
- Fast Recovery Body Diode

Applications

- High efficiency DC/DC Converters
- Synchronous Rectification
- Motor Drive



Marking Information

Part Number	Package	Marking
YPN 438S	SOP8	438S

Absolute Maximum Ratings

(Ta=25℃)

Absolute Maximum Ratings		TA=25°C unless otherwise noted		
Parameter	Symbol	Maximum		Units
		N MOS	P MOS	
Drain-Source Voltage	V_{GS}	±20	±20	V
Gate-Source Voltage	V_{DS}	40	-40	V
Continuous Drain Current, T_A=25℃	I_D	12.2	-10	A
Continuous Drain Current, T_A=70℃	I_D	8.5	-8	A
Pulsed Drain Current	I_{DM}	35	-30	A
Maximum Power Dissipation	P_D	2.5	2.8	W
Operating Junction and Storage Temperature Range	T_J, T_{STG}	-55 to 150		℃

Caution: Stresses greater than those listed in the “Absolute Maximum Ratings” may cause permanent damage to the device.

Thermal Characteristics

Symbol	Parameter	Value	Unit
$R_{\theta JC}$	Themal Resistance,Junction-to-Case	4.0	℃/W
$R_{\theta JA}$	Themal Resistance,Junction-to-Ambient	42	℃/W

Electrical Characteristics

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Units
Off Characteristics						
BV_{DSS}	Drain-Source Breakdown Voltage	I_D=±250mA, V_{GS}=0V	±40			V
I_{DSS}	Zero Gate Voltage Drain Current	V_{DS}=±40V, V_{GS}=0V			1	μA
I_{GSS}	Gate-Body leakage current	V_{DS}=0V, V_{GS}= ±20V			±100	nA
On Characteristics (Note 3)						
$V_{GS(th)}$	Gate Threshold Voltage	N MOS:V_{DS}=V_{GS} I_D=250mA	1	1.5	2.5	V
		P MOS:V_{DS}=V_{GS} I_D=-250mA	-1.1	-1.7	-2.5	
$R_{DS(ON)}$	Static Drain-Source On-Resistance	N MOS:V_{GS}=10V,I_D=10A		15	18	mΩ
		N MOS:V_{GS}=4.5V,I_D=8A		22	35	
		P MOS:V_{GS}=-10V,I_D=-7.2A		27	32	mΩ
		P MOS:V_{GS}=-4.5V,I_D=-5.6A		32	38	
gFS	Forward Transconductance	N MOS:V_{DS}=5V,I_D=8A	13			S
		P MOS:V_{DS}=-5V I_D=-5A	20			
Drain-Source Diode Characteristics						
V_{SD}	Diode Forward Voltage(Note 3)	N MOS:V_{GS}=0V,I_S=8A			1.2	V
		P MOS:V_{GS}=0V,I_S=-6A				
I_S	Maximum Body-Diode Continuous Current(Note 2)	N MOS			10	A
		P MOS			-6.2	
t_{rr}	Body Diode Reverse Recovery Time	N MOS:T_J = 25° C, I_F =10A ,di/dt =100A/μs(Note3)		35		ns
		P MOS:T_J = 25° C, I_F =-7A ,di/dt =100A/μs(Note3)		60		
Dynamic Characteristics (Note4)						
C_{iss}	Input Capacitance	N MOS		500		pf
C_{oss}	Output Capacitance	V_{DS}=20V,V_{GS}=0V,F=1.0MHz		60		
C_{rss}	Reverse Transfer Capacitance			25		
C_{iss}	Input Capacitance	P MOS		1750		
C_{oss}	Output Capacitance	V_{DS}=-20V,V_{GS}=0V,F=1.0MHz		215		
C_{rss}	Reverse Transfer Capacitance			180		
Switching Characteristics (Note 4)						
Q_g	Total Gate Charge	N MOS:V_{GS}=10V,V_{DS}=20V, I_D=8A		14		nC
Q_{gs}	Gate Source Charge			2.9		
Q_{gd}	Gate Drain Charge			5.2		
Q_g	Total Gate Charge	P MOS:V_{GS}=10V,V_{DS}=-20V, I_D=-5A		24		nC
Q_{gs}	Gate Source Charge			3.5		
Q_{gd}	Gate Drain Charge			6		
$t_{d(on)}$	Turn-On Delay time	N MOS: V_{DD}=20V,I_D=2A,R_L=6.7Ω V_{GS}=10V,R_G=3Ω		5		ns
t_r	Turn-On Rise Time			2.6		
$t_{d(off)}$	Turn-Off Delay Time			16.1		
t_f	Turn-Off Fall Time			2.3		
$t_{d(on)}$	Turn-On Delay time	P MOS: V_{DD}=-20V,I_D=-2A,R_L=2Ω		9		ns
t_r	Turn-On Rise Time			8		

$t_{d(off)}$	Turn-Off Delay Time	V_{GS}=-10V, R_G=3Ω		28		
t_f	Turn-Off Fall Time			10		

Notes:

1. Repetitive Rating: Pulse width limited by maximum junction temperature.

2. Surface Mounted on FR4 Board, t ≤ 10 sec.

3. Pulse Test: Pulse Width ≤ 300μs, Duty Cycle ≤ 2%.

4. Guaranteed by design, not subject to production.

Typical Electrical and Thermal Characteristics (Curves):P MOS

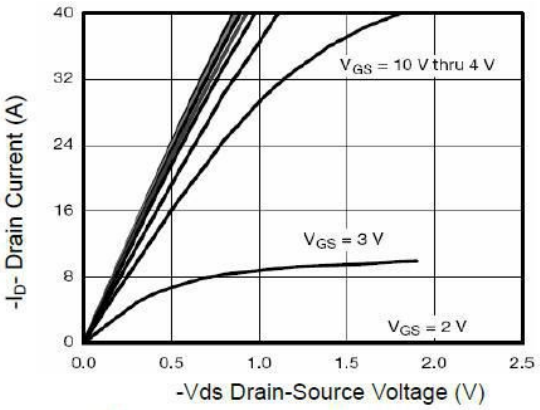


Figure 1 Output Characteristics

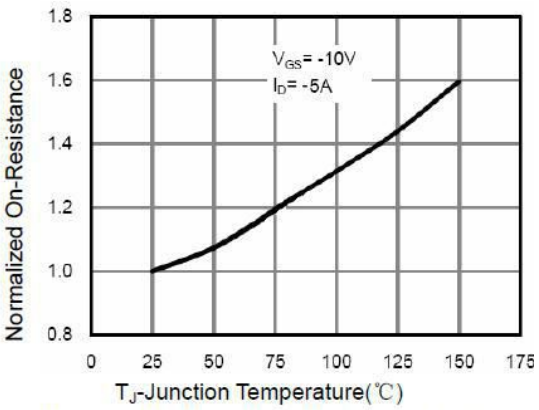


Figure 4 Rdson-Junction Temperature

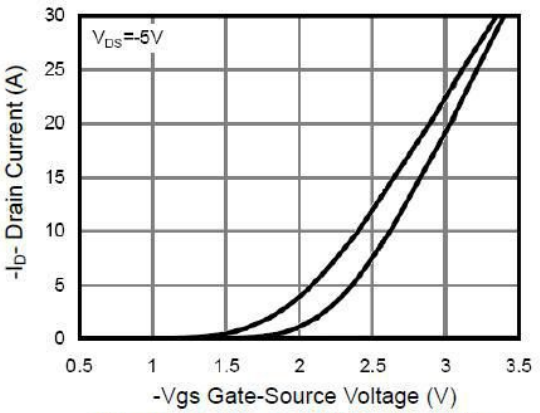


Figure 2 Transfer Characteristics

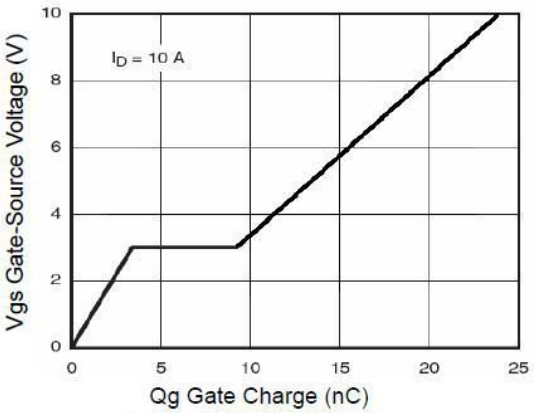


Figure 5 Gate Charge

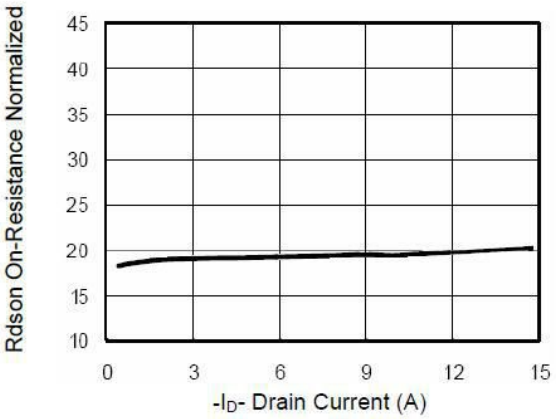


Figure 3 Rdson- Drain Current

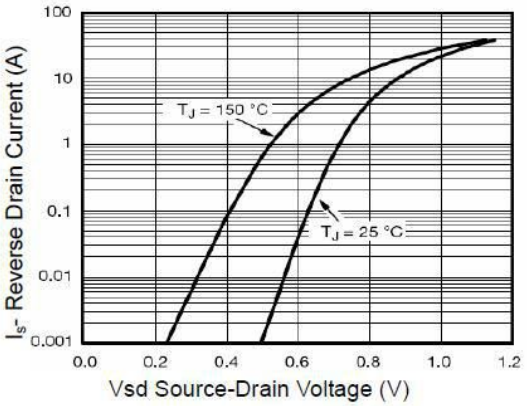


Figure 6 Source- Drain Diode Forward

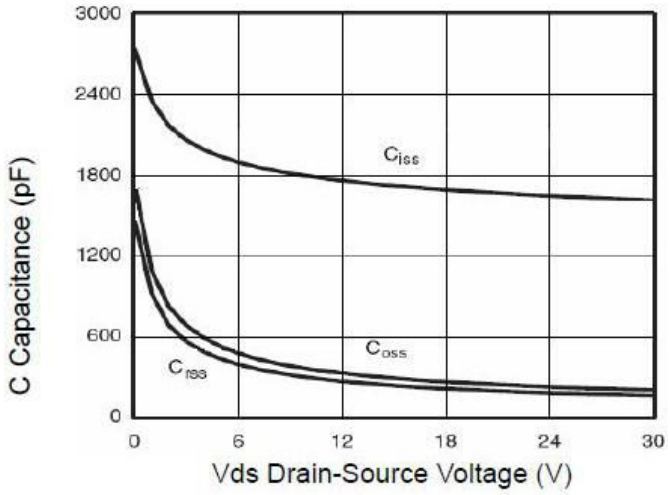


Figure 7 Capacitance vs Vds

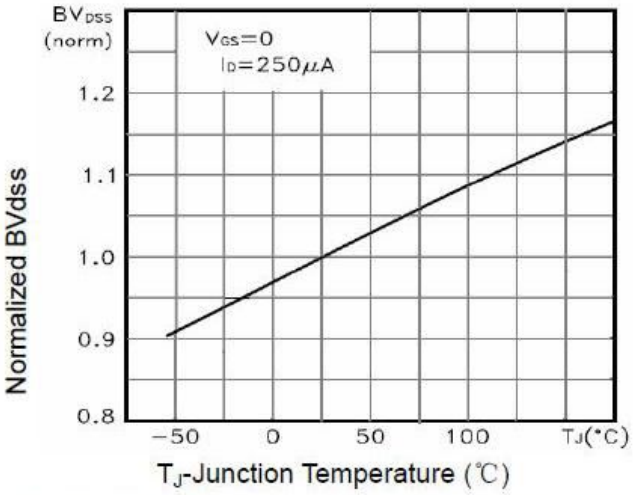


Figure 9 BV_{DSS} vs Junction Temperature

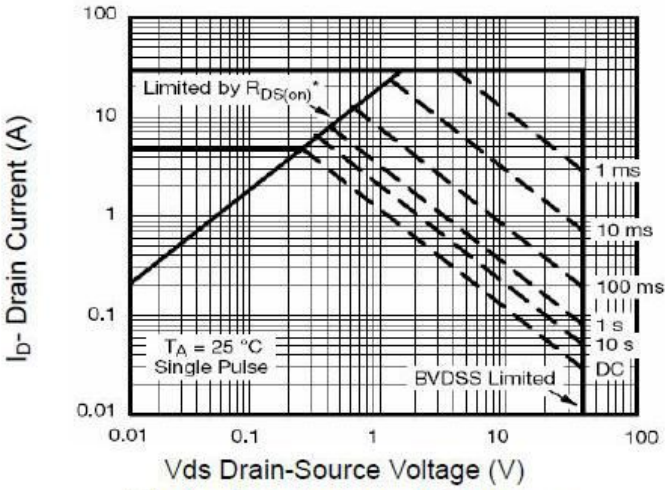


Figure 8 Safe Operation Area

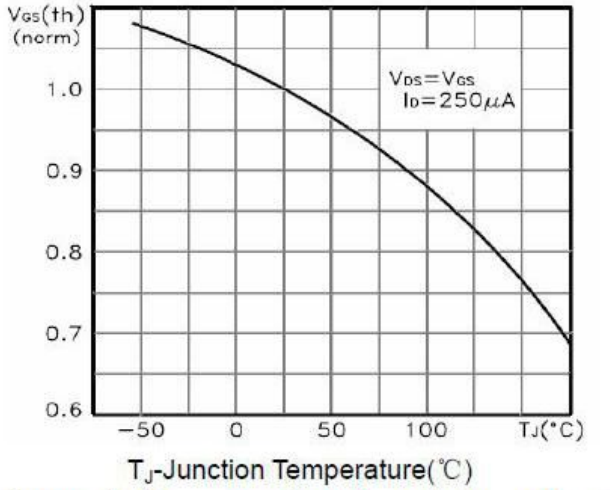


Figure 10 $V_{GS(th)}$ vs Junction Temperature

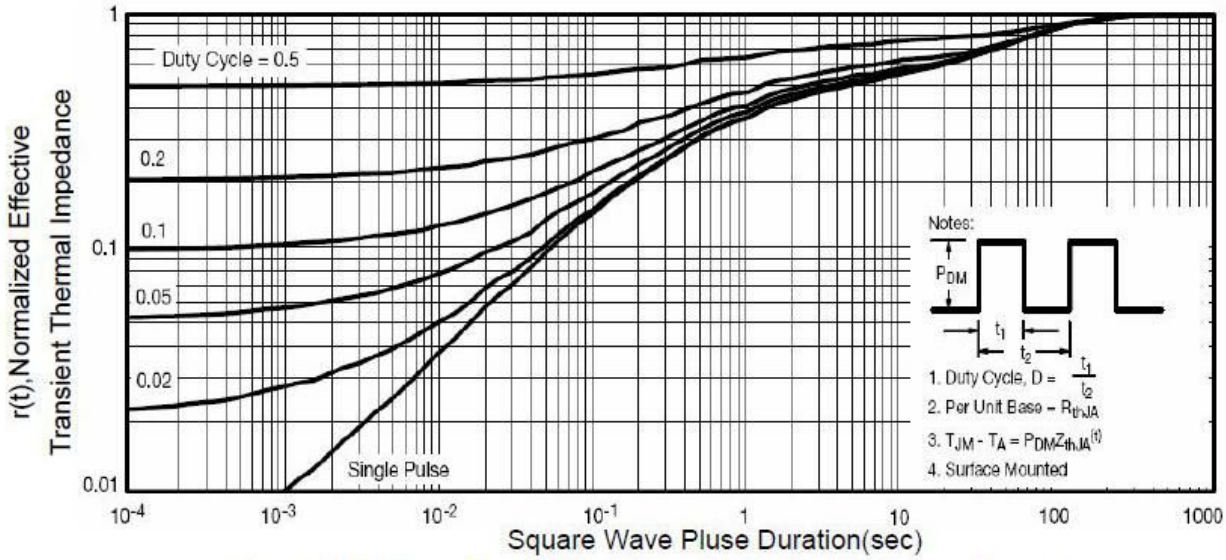


Figure 11 Normalized Maximum Transient Thermal Impedance

Typical Electrical and Thermal Characteristics (Curves):N MOS

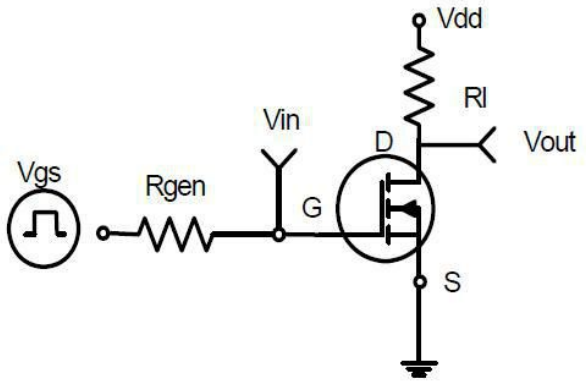


Figure 1:Switching Test Circuit

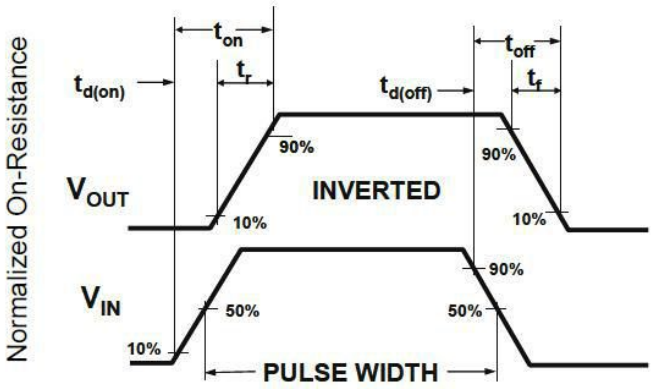


Figure 2:Switching Waveforms

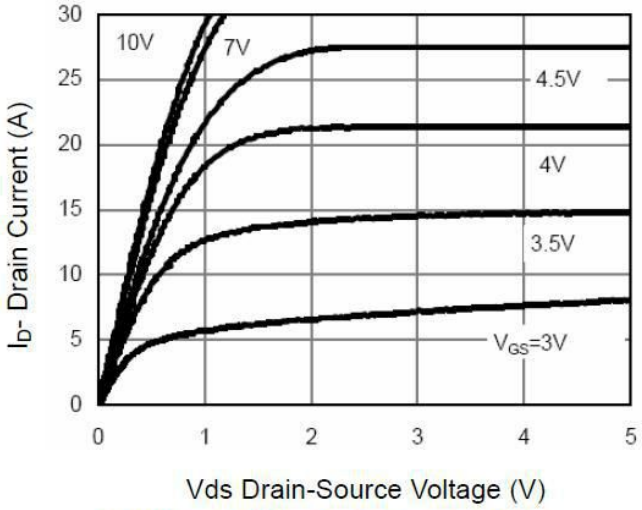


Figure 3 Output Characteristics

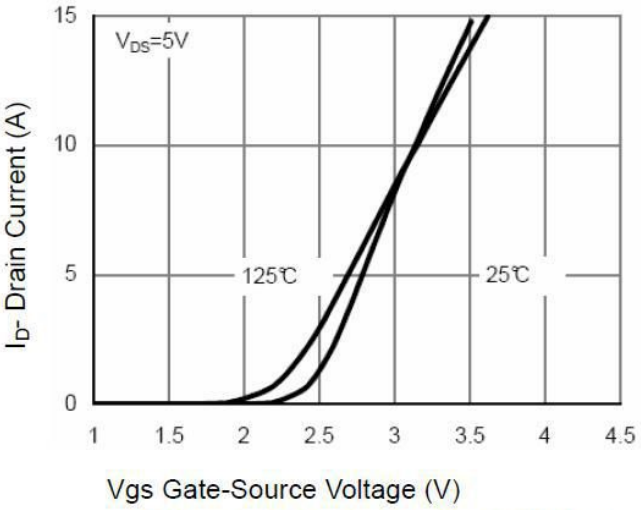


Figure 4 Transfer Characteristics

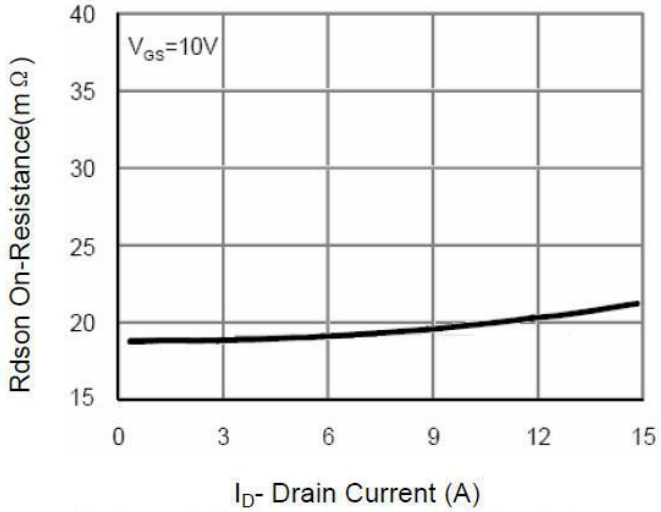


Figure 5 Drain-Source On-Resistance

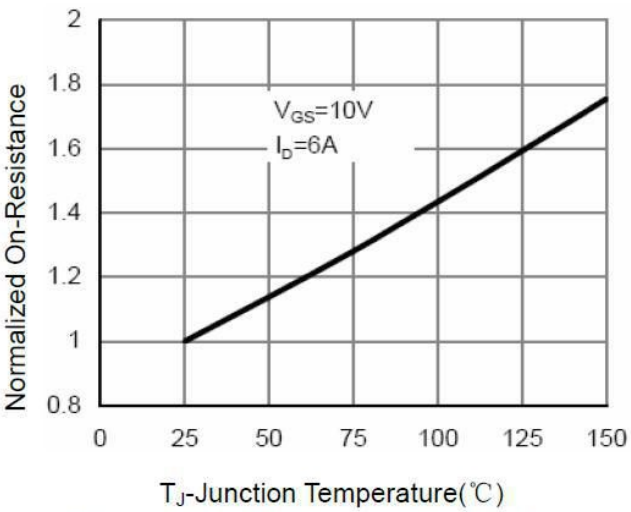


Figure 6 Drain-Source On-Resistance

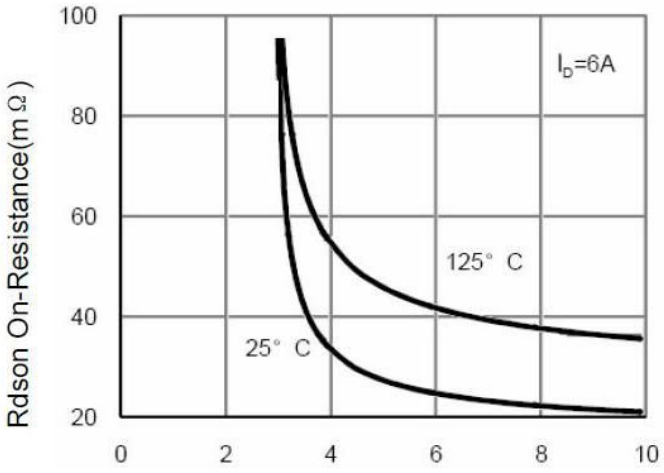


Figure7 Rdson vs Vgs

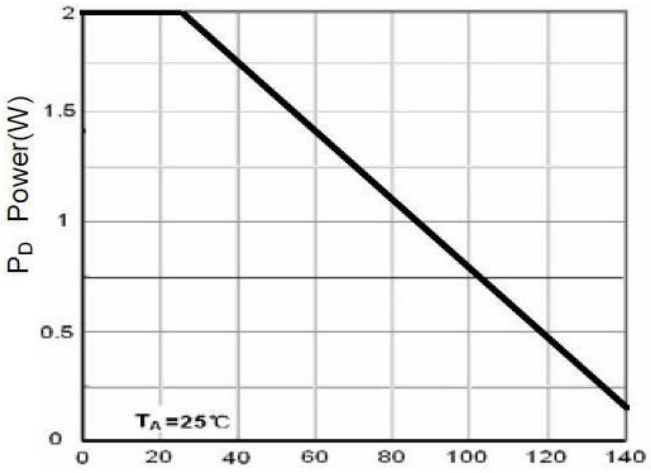


Figure 8 Power Dissipation

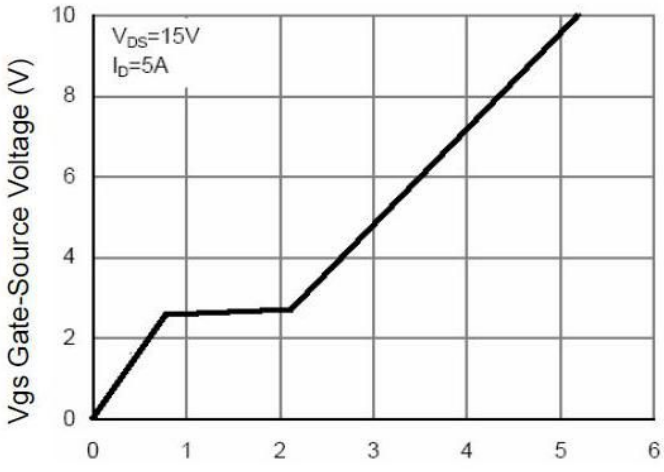


Figure 9 Gate Charge

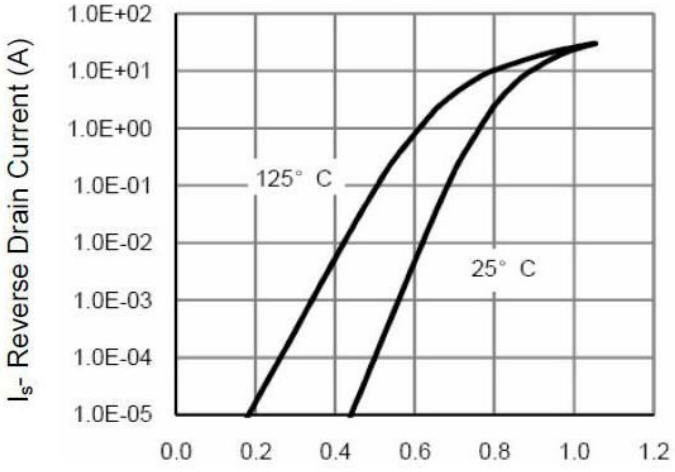


Figure 10 Source- Drain Diode Forward

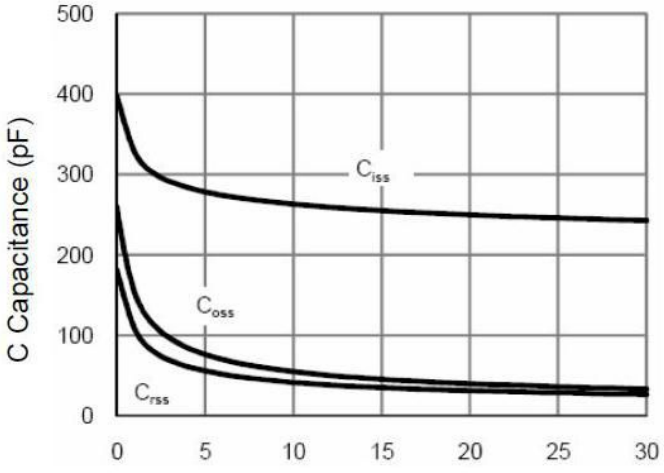


Figure 11 Capacitance vs Vds

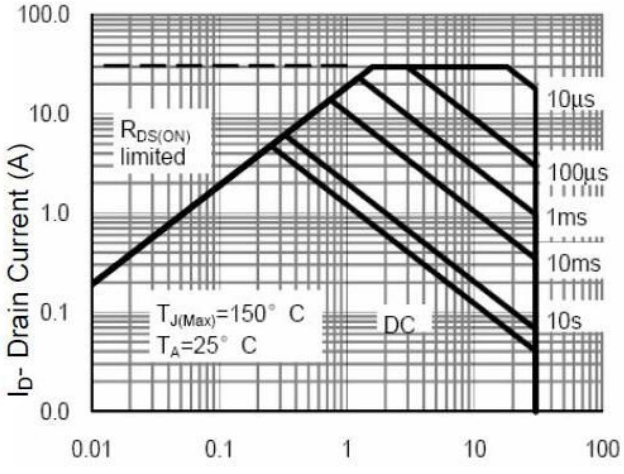


Figure 12 Safe Operation Area

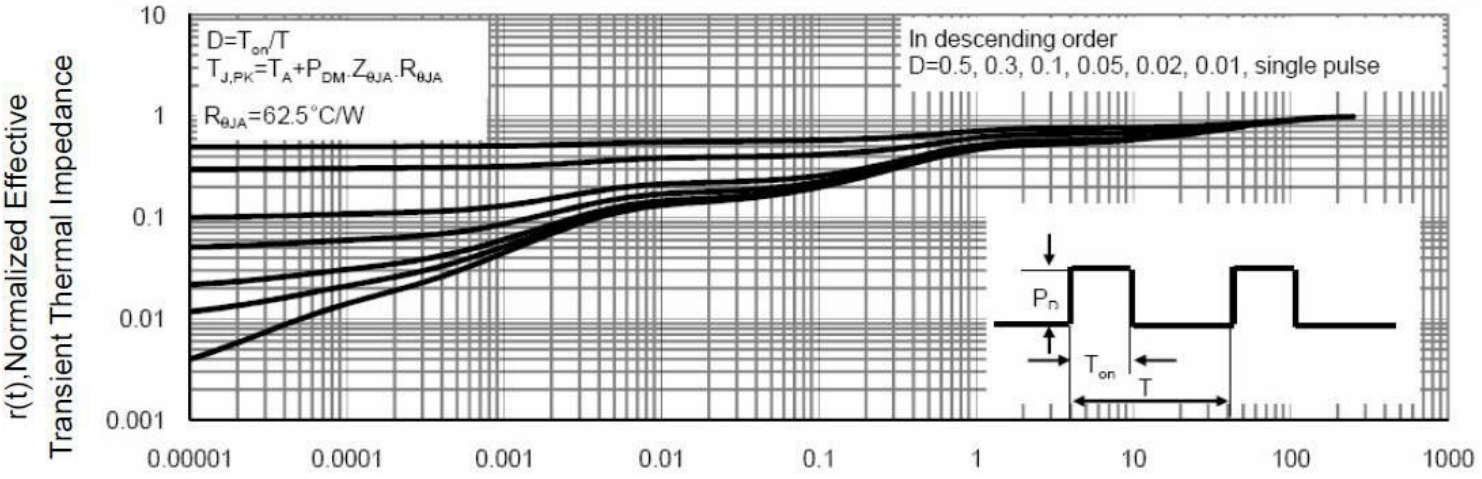


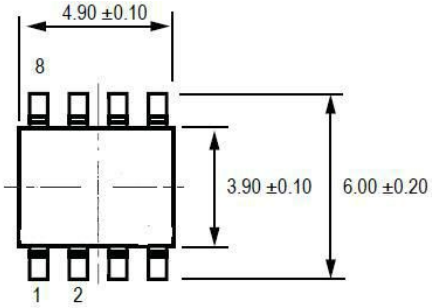
Figure 13 Normalized Maximum Transient Thermal Impedance

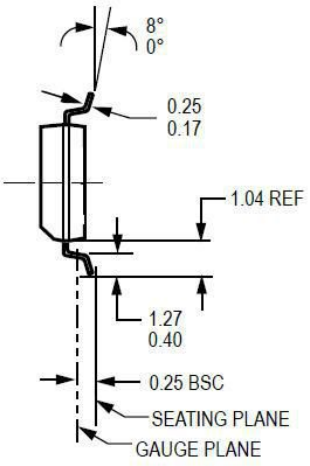
Ordering Information :

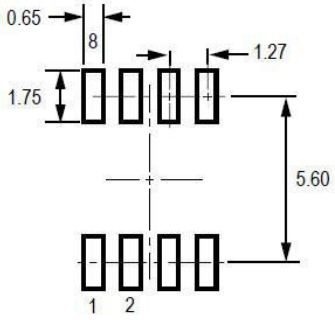
订货信息/Ordering Information

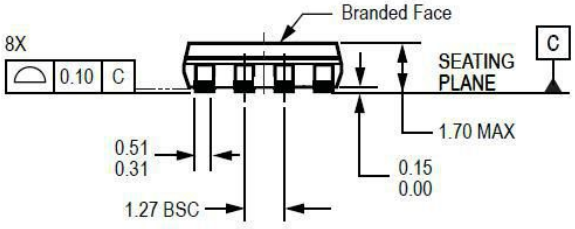
	Y	P	N/	4	38	S	()
	公司商标代号 Company symbol						
		P:P MOS					
			N:N MOS				
				负载电压 Load voltage：40-40V; 60-60V			
					$R_{DS(on)}$ ： 38-38mΩ		
						D:DIP;S:SOP	
							用户特殊编号 Special code

Dimension and PCB layout :









C PCB Layout Reference View

Dimensions in millimeters
Dimensions exclusive of mold f
Exact case and lead configurat