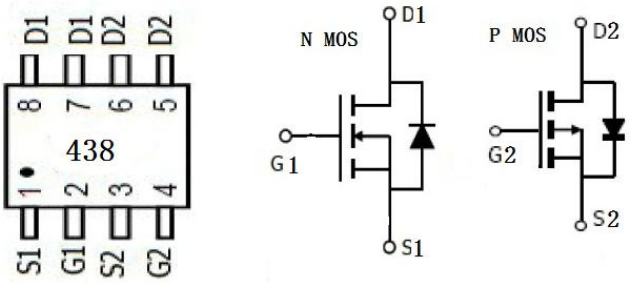
YPN 438S——40V 10A N&P-Channel Power MOSFET (2 IN 1)

General 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



Ordering Information

Part Number	Package	Marking
YPN 438S	SOP-8	438

Absolute Maximum Ratings

Absolute Maximum Ratings			T_A=25°C unless otherwise noted		
Parameter		**Symbol**	**Maximum**		**Units**
			N MOS	**P MOS**	
Drain-Source Voltage		V_{DS}	+40	-40	V
Gate-Source Voltage		V_{GS}	±20 V	±20 V	V
Continuous Drain Current	T_A=25℃	I_D	12.2	-10	A
	T_A=70℃		8.5	**-8**	
Pulsed Drain Current		I_{DM}	35	-30	
Maximum Power Dissipation			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
$R_{\theta JC}$	Thermal Resistance, Junction-to-Case	4.0	℃/W
$R_{\theta JA}$	Thermal Resistance, Junction-to-Ambient	42	

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	NMOS:V_{DS}=V_{GS} I_D=250mA	1	1.5	2.5	V
		PMOS:V_{DS}=V_{GS} I_D=-250mA	-1.1	-1.7	-2.5	
$R_{DS(ON)}$	Static Drain-Source On-Resistance	NMOS: V_{GS}=10V, I_D=10A		15	18	mΩ
		NMOS: V_{GS}=4.5V, I_D=8A		22	35	
		PMOS: V_{GS}=-10V, I_D=-7.2A		27	32	mΩ
		PMOS: V_{GS}=-4.5V, I_D=-5.6A		32	38	
g_{FS}	Forward Transconductance	NMOS:V_{DS}=5V, I_D=8A	13			S
		PMOS:V_{DS}=-5V, I_D=-5A	20			
Drain-Source Diode Characteristics						
V_{SD}	Diode Forward Voltage(Note 3)	NMOS:V_{GS}=0V, I_S=8A			1.2	V
		PMOS:V_{GS}=0V,I_S=-6A				
I_S	Maximum Body-Diode Continuous Current(Note 2)	NMOS			10	A
		PMOS			-6.2	
t_{rr}	Body Diode Reverse Recovery Time	NMOS: T_J = 25°C, I_F =10A ,di/dt = 100A/μs(Note3)		35		ns
		PMOS: T_J = 25°C, I_F = -7A ,di/dt = 100A/μs(Note3)		60		
Dynamic Characteristics (Note4)						
C_{iss}	Input Capacitance	NMOS		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	PMOS		1750		
C_{oss}	Output Capacitance	V_{DS}=-20V,V_{GS}=0V, F=1.0MHz		215		
C_{rss}	Reverse Transfer Capacitance			180		

Symbol	Parameter	Conditions	Min	Typ	Max	Units
Switching Characteristics (Note 4)						
Q_g	Total Gate Charge	NMOS : 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	PMOS : 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	NMOS: 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	PMOS: V_{DD}=-20V, I_D=-2A ,R_L=2Ω, V_{GS}=-10V,R_{GEN}=3Ω		9		ns
t_r	Turn-On Rise Time			8		
$t_{d(off)}$	Turn-Off Delay Time			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

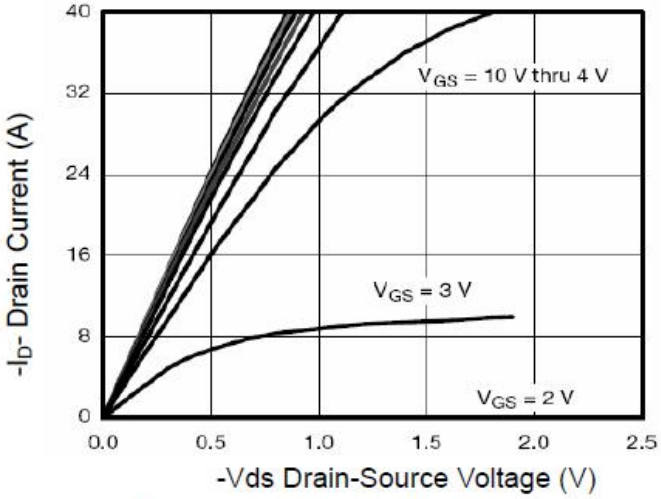


Figure 1 Output Characteristics

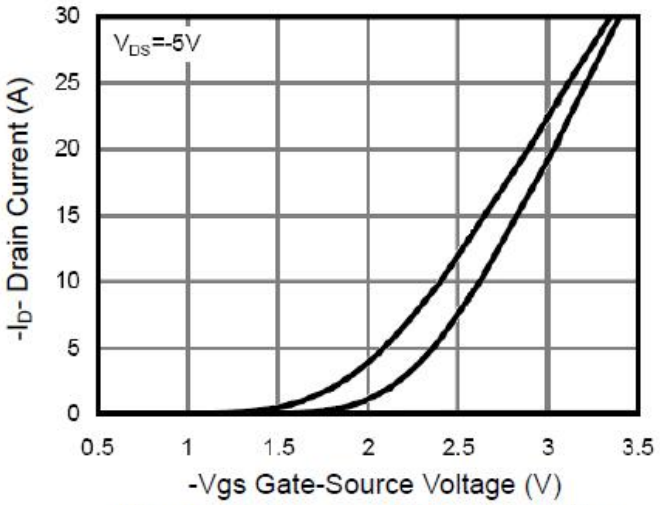


Figure 2 Transfer Characteristics

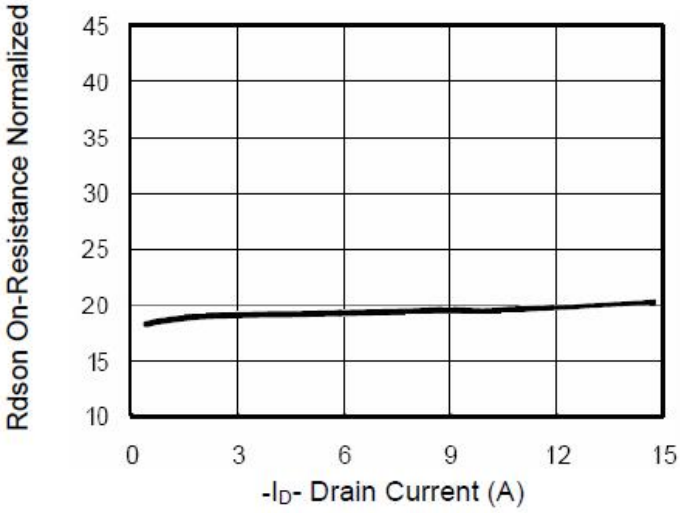


Figure 3 Rdson- Drain Current

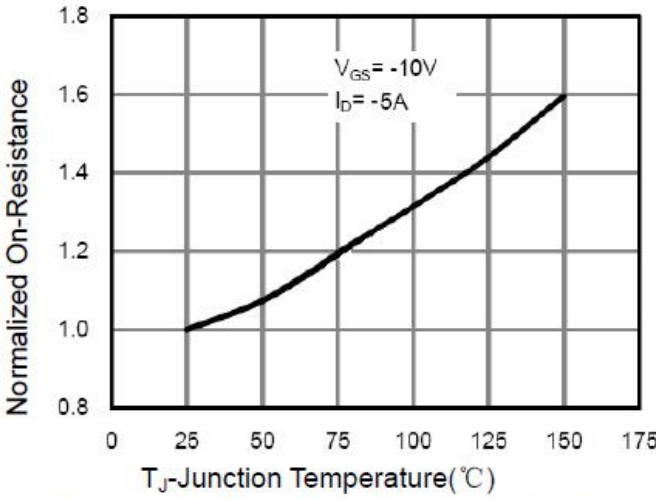


Figure 4 Rdson-Junction Temperature

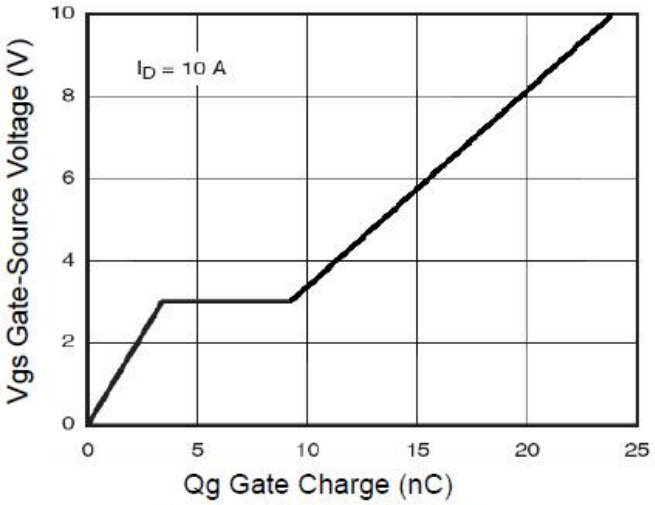


Figure 5 Gate Charge

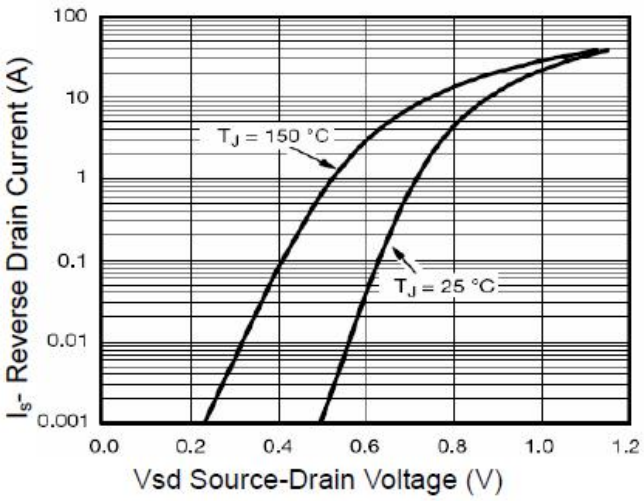


Figure 6 Source- Drain Diode Forward

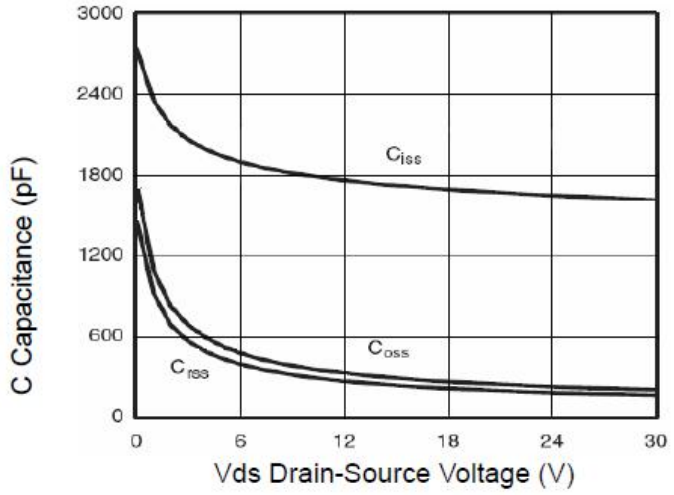


Figure 7 Capacitance vs Vds

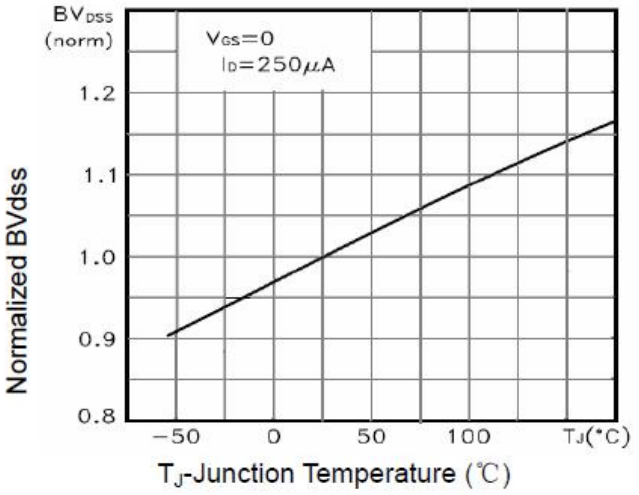


Figure 9 BV_{DSS} vs Junction Temperature

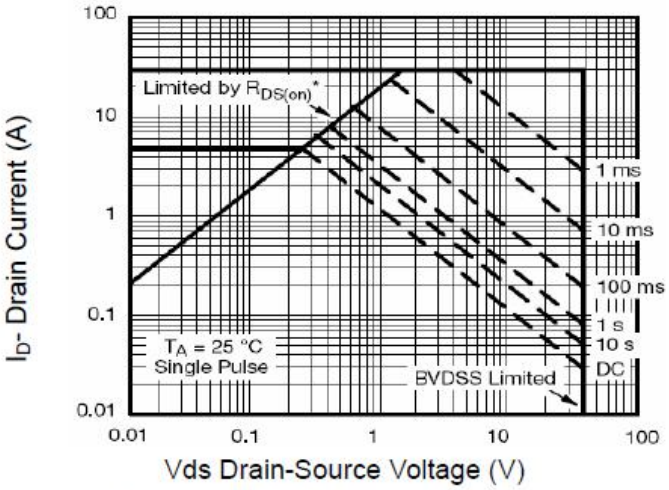


Figure 8 Safe Operation Area

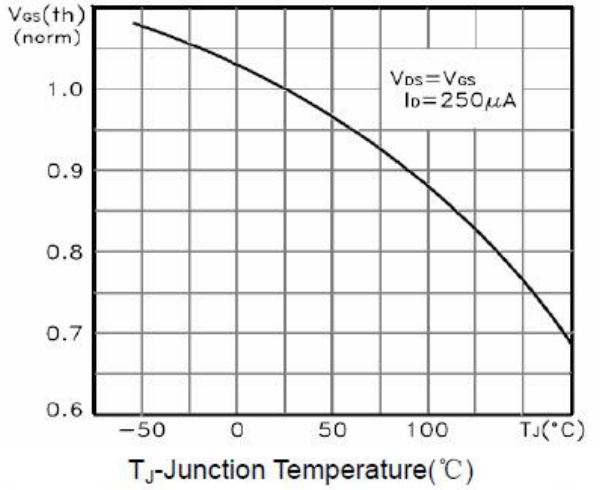


Figure 10 $V_{GS(th)}$ vs Junction Temperature

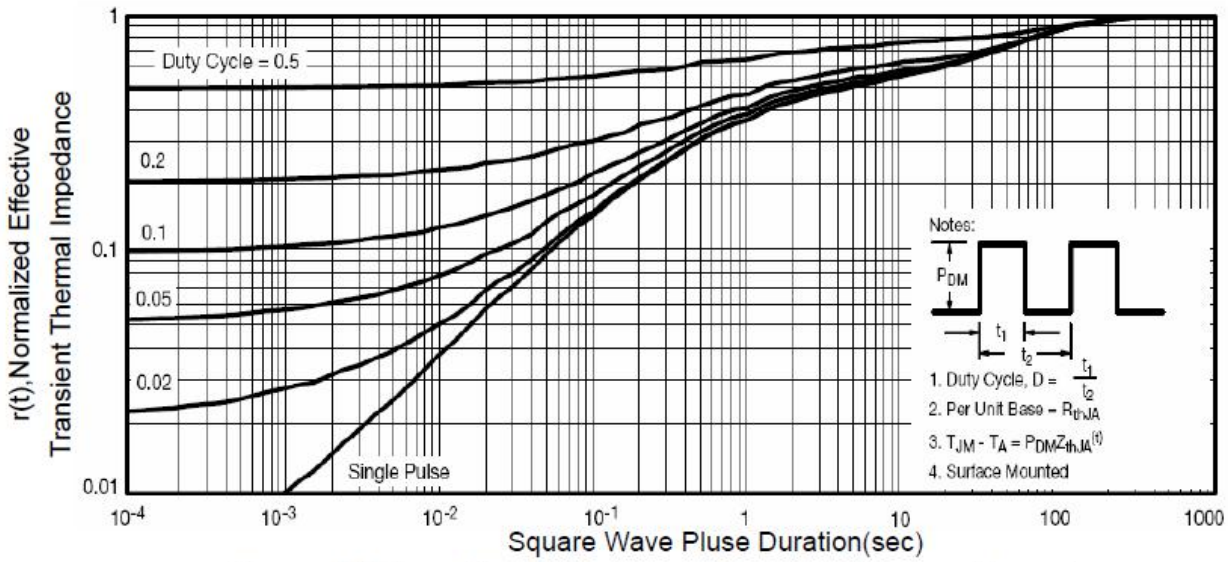


Figure 11 Normalized Maximum Transient Thermal Impedance

Typical Electrical and Thermal Characteristics (Curves):N MOS

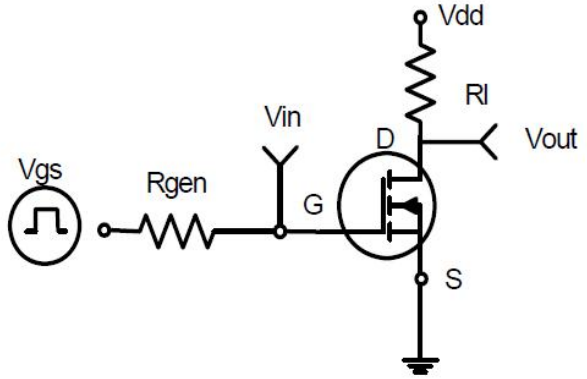


Figure 1:Switching Test Circuit

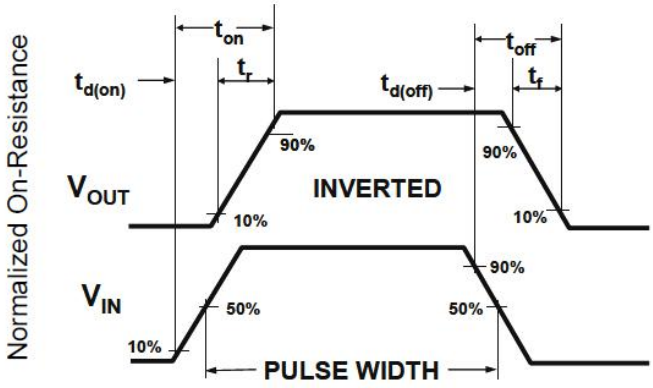


Figure 2:Switching Waveforms

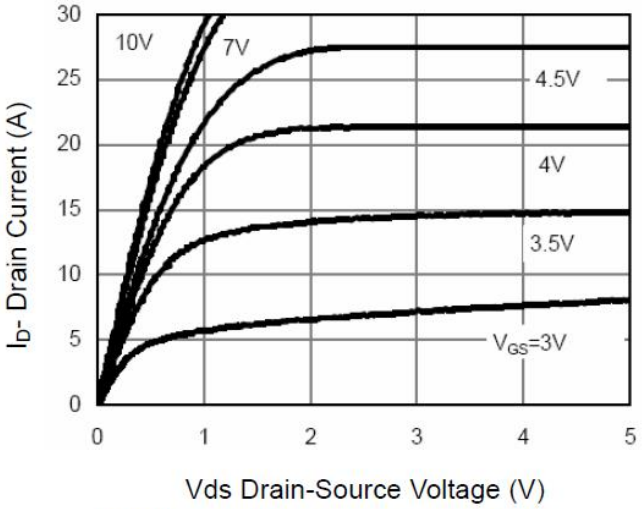


Figure 3 Output Characteristics

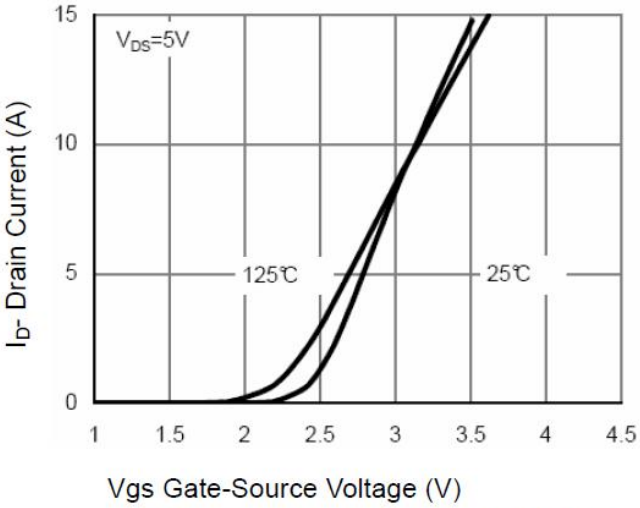


Figure 4 Transfer Characteristics

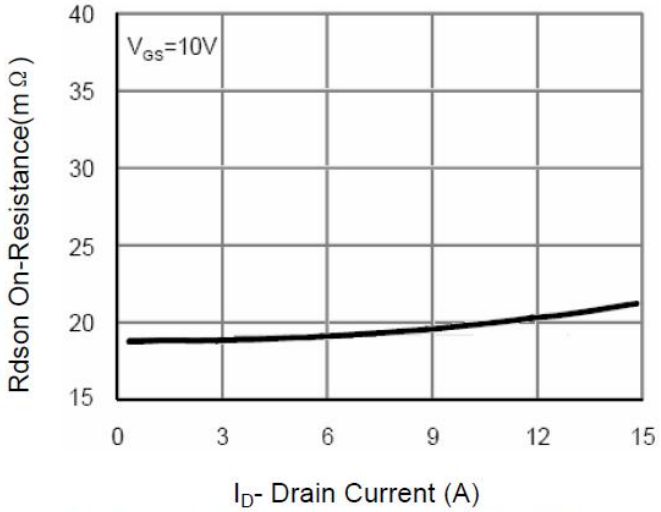


Figure 5 Drain-Source On-Resistance

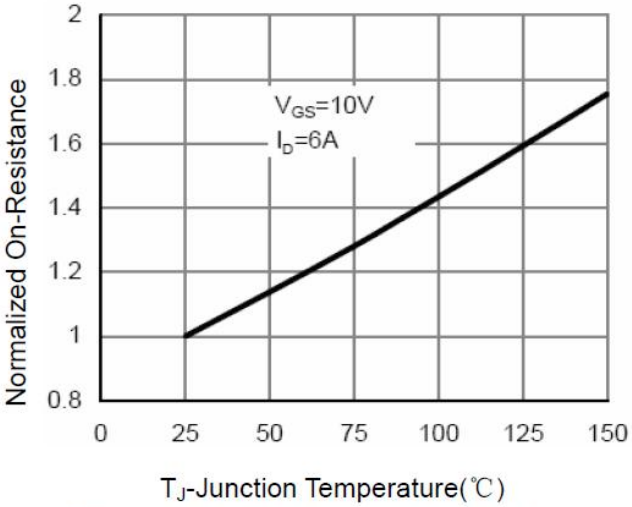


Figure 6 Drain-Source On-Resistance

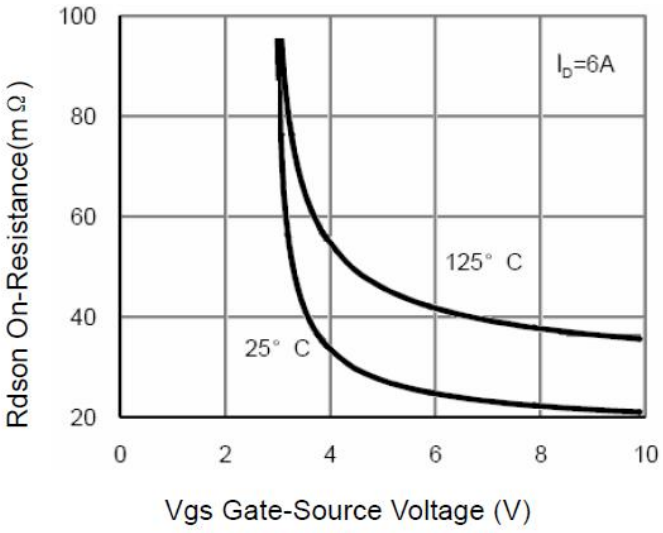


Figure7 Rdson vs Vgs

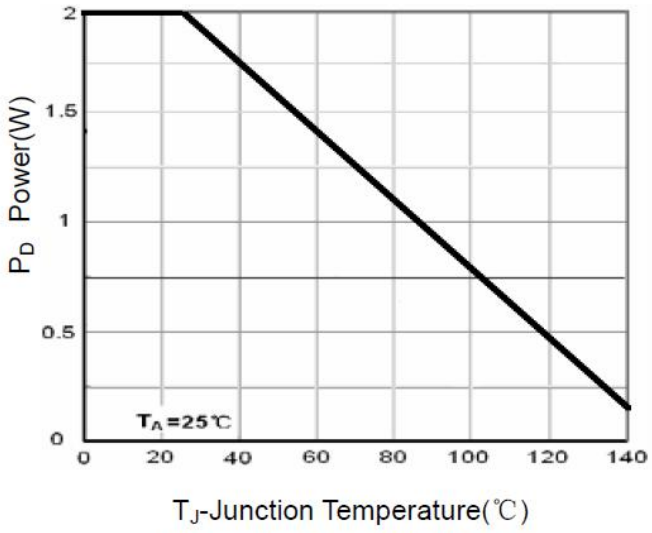


Figure 8 Power Dissipation

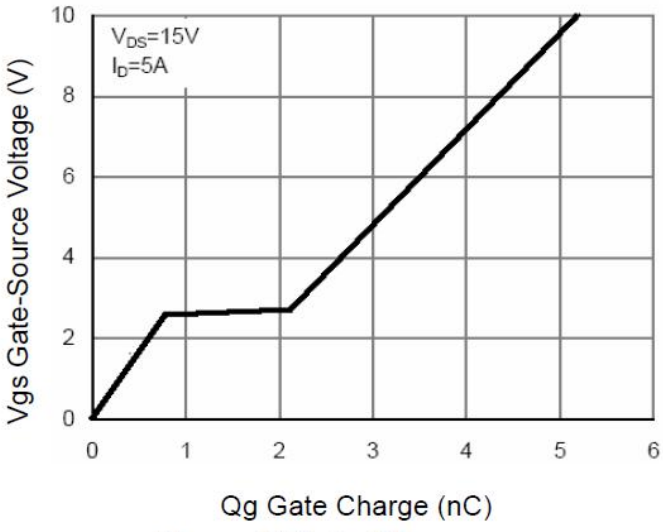


Figure 9 Gate Charge

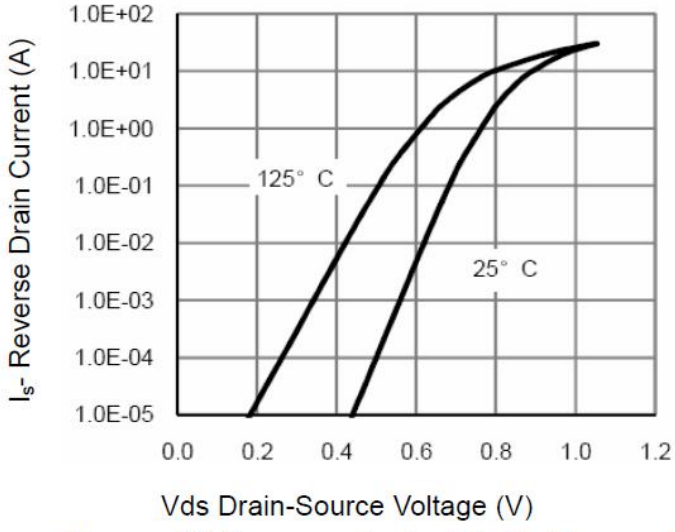


Figure 10 Source- Drain Diode Forward

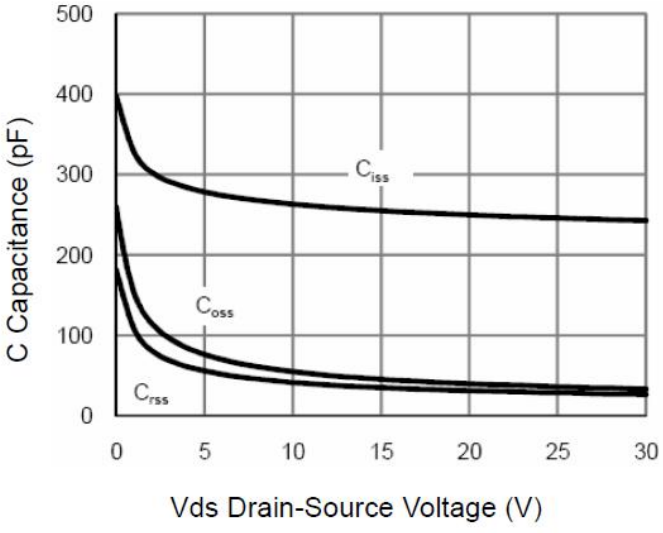


Figure 11 Capacitance vs Vds

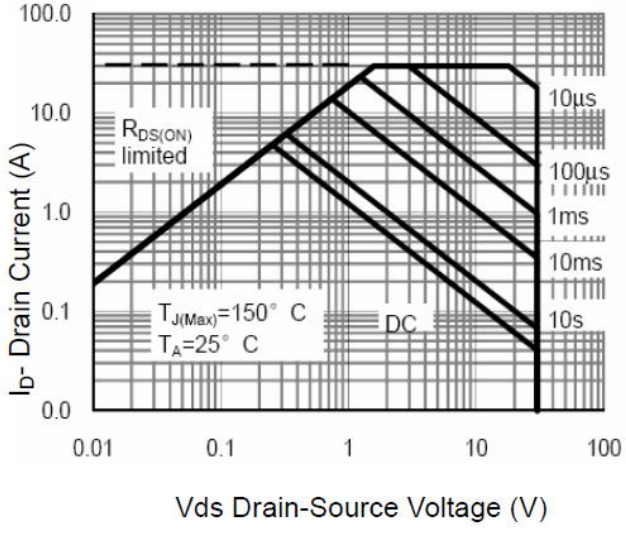


Figure 12 Safe Operation Area

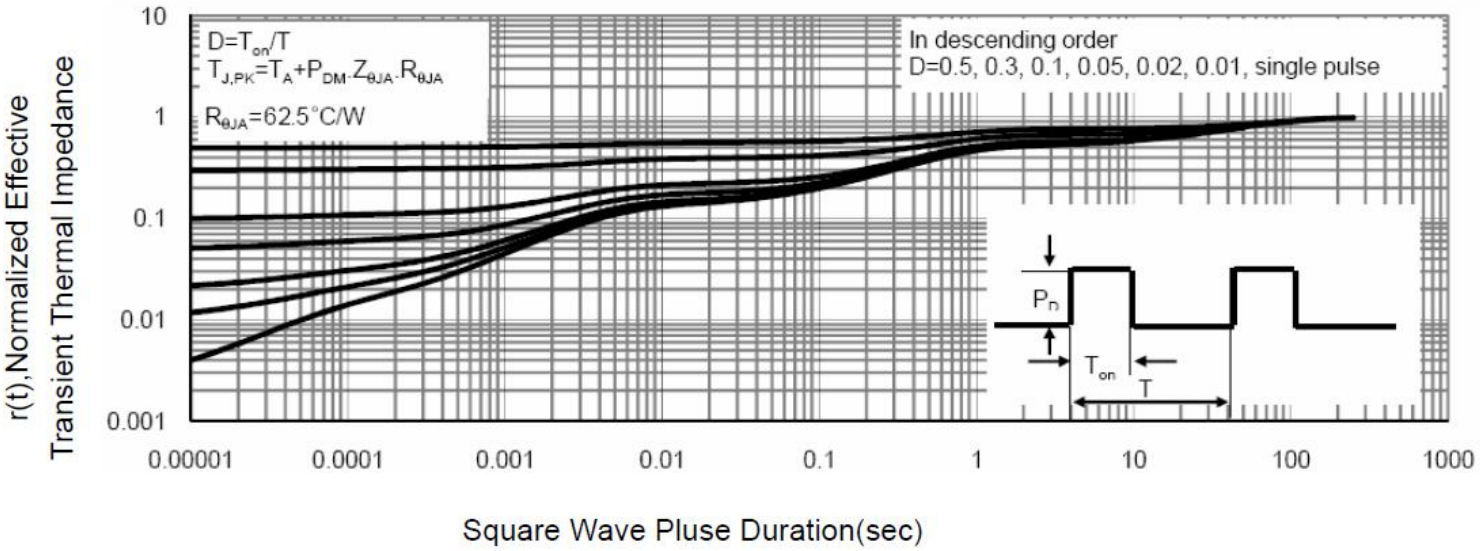
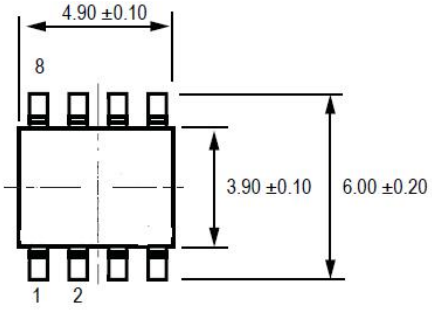


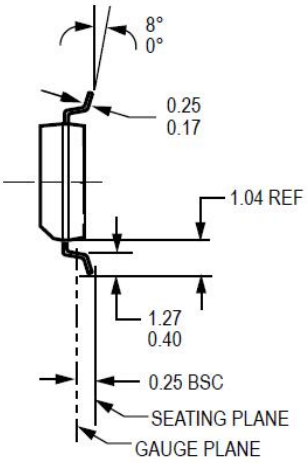
Figure 13 Normalized Maximum Transient Thermal Impedance

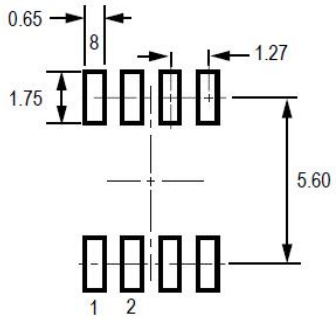
Order information:

Order information							
	Y	2	N/	6	55	S	()
公司商标代号 Company symbol							
	1：NIL ,2:2 MOS						
			P: PMOS，N:N MOS				
				BVDSS：6—60V;10—100V;20—200V；35—350V；40—400V			
					RDS(on) ： 55—55mΩ;38—38mΩ; 16—16mΩ		
						D:DIP;S:SOP	
							Special code

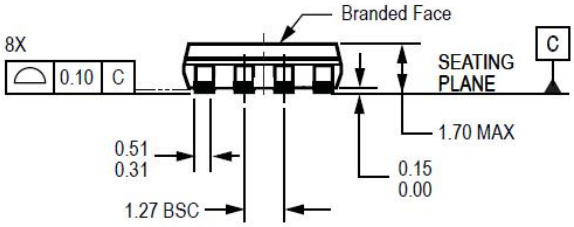
Dimension and PCB layout :







PCB Layout Reference View



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