N -& P-Channel Enhancement Mode Field Effect Transistor

◆ DESCRIPTION

These miniature surface mount MOSFETs utilize High Cell Density process. Low $R_{DS(on)}$ assures minimal power loss and conserves energy, making this device ideal for use in power management circuitry.

Typical applications are PWM DC-DC converters, power management in portable and battery-powered products such as computers, printers, battery charger, telecommunication power system, and telephones power system.

◆ FEATURES

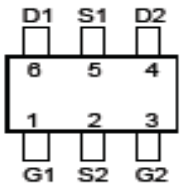
- 20V/3.6A, $R_{DS(ON)}$ = 60mΩ @ V_{GS} = 4.5V
- 20V/3.0A, $R_{DS(ON)}$ = 85mΩ @ V_{GS} = 2.5V
- 20V/2.0A, $R_{DS(ON)}$ = 140mΩ @ V_{GS} = 1.8V
- -20V/-3.1A, $R_{DS(ON)}$ = 115mΩ @ V_{GS} = -4.5V
- -20V/-2.0A, $R_{DS(ON)}$ = 180mΩ @ V_{GS} = -2.5V
- -20V/-1.0A, $R_{DS(ON)}$ = 300mΩ @ V_{GS} = -1.8V
- Fast switching speed

◆ APPLICATIONS

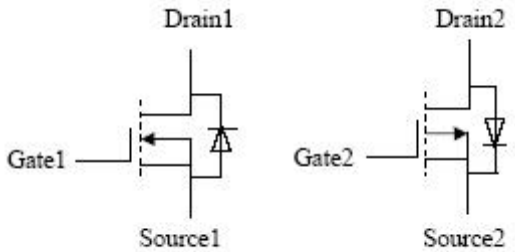
- Inverter
- Synchronous Buck
- DC FAN

◆ PIN CONFIGURATION

TSOP-6 (Top view)



MT6604



◆ ABSOLUTE MAXIMUM RATINGS

(T_A=25°C Unless Otherwise Noted)

Parameter		Symbol	N-Channel	P-Channel	Unit
Drain-Source Voltage		V_{DS}	20	-20	V
Gate-Source Voltage		V_{GS}	±12	±12	V
Continuous Drain Current	T_A=25°C	I_D	3.6	-3.1	A
	T_A=70°C		2.9	-2.3	
Pulsed Drain Current [a]		I_{DM}	10	-10	A
Power Dissipation	T_A=25°C	P_D	1.15		W
	T_A=70°C		0.73		
Operating Junction and Storage Temperature Range		T_J,T_{STG}	-55 to 150		°C
Lead Temperature (1/16" from case for 10sec.)		T_L	275		

◆ THERMAL RESISTANCE RATINGS

Thermal Resistance		Symbol	Maximum	Unit
Junction-to-Ambient	T≦5sec	$R_{\theta JA}$	110	°C/W
Junction-to-Ambient	Steady State	$R_{\theta JA}$	150	°C/W
Junction-to-Lead	Steady State	$R_{\theta JL}$	80	°C/W

Note :

a. Pulse width limited by maximum junction temperature.

◆ ELECTRICAL CHARACTERISTICS

(T_A=25°C Unless Otherwise Noted)

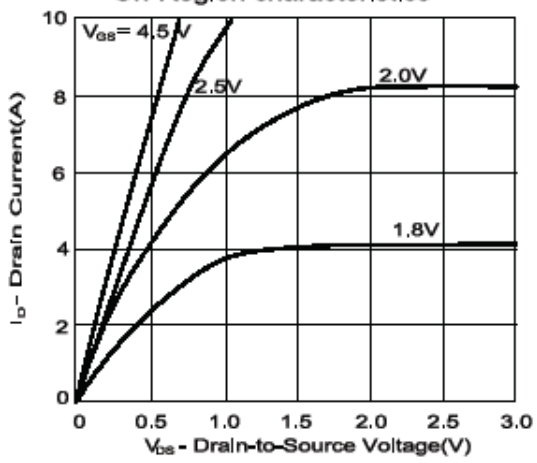
Parameter	Symbol	Test Conditions	Limits				Unit
			Ch	Min	Typ	Max	
Static							
Drain-Source Breakdown Voltage	$V_{(BR)DSS}$	V_{GS} = 0V, I_D = 250μA	N	20	-	-	V
		V_{GS} = 0V, I_D = -250μA	P	-20	-	-	
Gate-Threshold Voltage	$V_{GS(th)}$	V_{DS} = V_{GS}, I_D = 250μA	N	0.4	0.8	1.2	V
		V_{DS} = V_{GS}, I_D = -250μA	P	-0.4	-0.8	-1.2	
Gate-Body Leakage	I_{GSS}	V_{DS} = 0V, V_{GS} = ±12V	N	-	-	±100	nA
		V_{DS} = 0V, V_{GS} = ±12V	P	-	-	±100	
Zero Gate Voltage Drain Current	I_{DSS}	V_{DS} = 16V, V_{GS} = 0V	N	-	-	1	uA
		V_{DS} = -16V, V_{GS} = 0V	P	-	-	-1	
		V_{DS} = 16V, V_{GS} = 0V, T_J = 55 °C	N	-	-	10	uA
		V_{DS} = -16V, V_{GS} = 0V , T_J = 55 °C	P	-	-	-10	uA
On-State Drain Current [1]	$I_{D(on)}$	V_{DS} = 5V, V_{GS} = 10V	N	10	-	-	A
		V_{DS} =-5V, V_{GS} = -10V	P	-10	-	-	
Drain-Source On-Resistance[1]	$R_{DS(on)}$	V_{GS} = 1.8V, I_D = 2.0A	N	-	82	140	mΩ
		V_{GS} = -1.8V, I_D = -1.0A	P	-	214	300	
		V_{GS} = 2.5V, I_D = 3.0A	N	-	60	85	mΩ
		V_{GS} = -2.5V, I_D = -2.0A	P	-	125	180	
		V_{GS} = 4.5V, I_D = 3.6A	N	-	56	60	
		V_{GS} = -4.5V, I_D = -3.1A	P	-	98	115	
Forward Tranconductance[1]	g_{fs}	V_{DS} = 5V, I_D = 3.6A	N	-	10	-	S
		V_{DS} = -5V, I_D = -3.1A	P	-	6	-	
Dynamic							
Total Gate Charge[2]	Q_g	N-Channel V_{DS} = 0.5$V_{(BR)DSS}$, V_{GS} = 4.5V, I_D = 3.6A P-Channel V_{DS} = 0.5$V_{(BR)DSS}$, V_{GS} = -4.5V,I_D = -3.1A	N	-	5.4	8.1	nC
			P	-	5.6	8.4	
Gate-Source Charge[2]	Q_{gs}		N	-	0.7	-	
			P	-	2.3	-	
Gate-Drain Charge[2]	Q_{gd}		N	-	1.7	-	
			P	-	1.5	-	
Turn-On Delay Time[2]	$t_{d(on)}$	N-Channel V_{DS} = 10V, I_D≡1.0A, V_{GS} = 4.5V, R_{GEN} =2.5Ω P-Channel V_{DS} = -10V, I_D≡-1.0A, V_{GS} = -4.5V, R_{GEN} = 6Ω	N	-	2.7	-	nS
			P	-	11	-	
Rise Time[2]	t_r		N	-	2.5	-	
			P	-	32	-	
Turn-Off Delay Time[2]	$t_{d(off)}$		N	-	24	-	
			P	-	38	-	
Fall-Time[2]	t_f		N	-	3.2	-	
			P	-	32	-	

Input Capacitance	Ciss	N-Channel V_{GS}=0V, V_{DS}= 10V , f =1MHz P-Channel V_{GS}=0V, V_{DS} = -10V, f =1MHz	N	-	418	-	pF
			P	-	476	-	
Output Capacitance	Coss		N	-	60	-	
			P	-	260	-	
Reverse Transfer Capacitance	Crss		N	-	42	-	
			P	-	105	-	
Source-Drain Diode Ratings and Characteristics (Tc=25℃)							
Forward Voltage[1]	V_{SD}	I_F = 0.8A, V_{GS} = 0V	N	-	-	1.2	V
		I_F = -0.8A, V_{GS} = 0V	P	-	-	-1.2	
Reverse Recovery Time	trr	I_F = 0.8A, dIF/dt = 100A / μS	N	-	40	80	nS
		I_F = -0.8A, dIF/dt = 100A / μS	P	-	40	80	

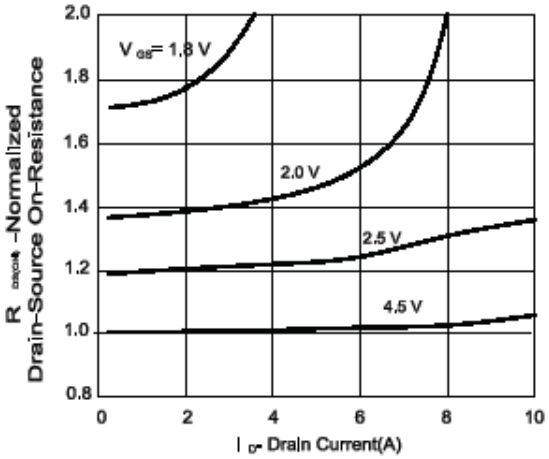
1. Pulse test : Pulse Width ≤ 300 μsec, Duty Cycle ≤ 2%.
2. Independent of operating temperature.
3. Pulse width limited by maximum junction temperature.

◆ TYPICAL CHARACTERICTICS (N-Channel)

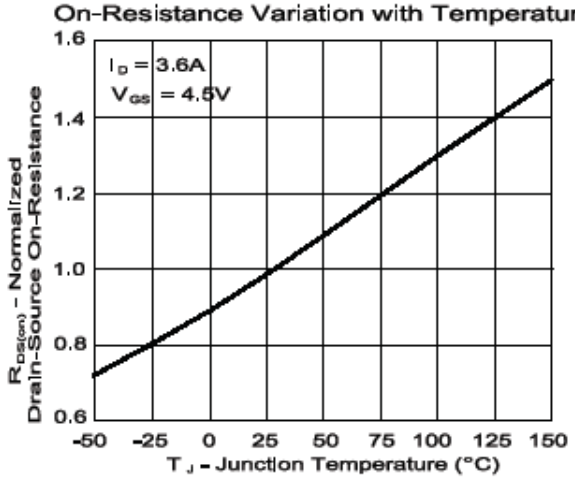
On-Region characteristics



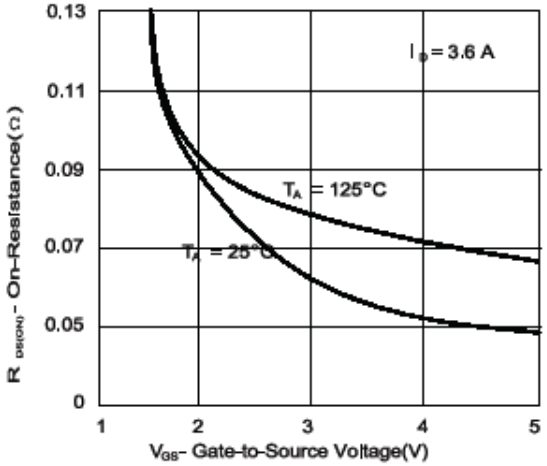
On-Resistance Variation with Drain Current and Gate Voltage



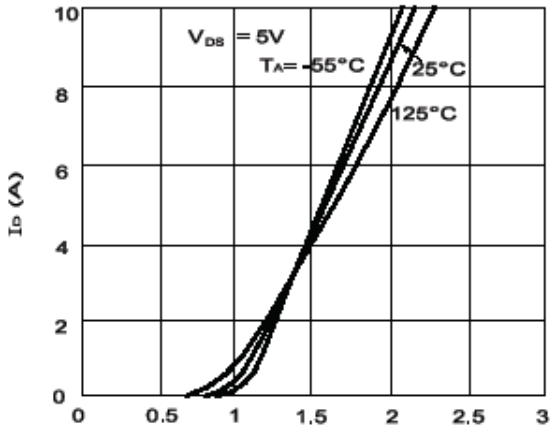
On-Resistance Variation with Temperature



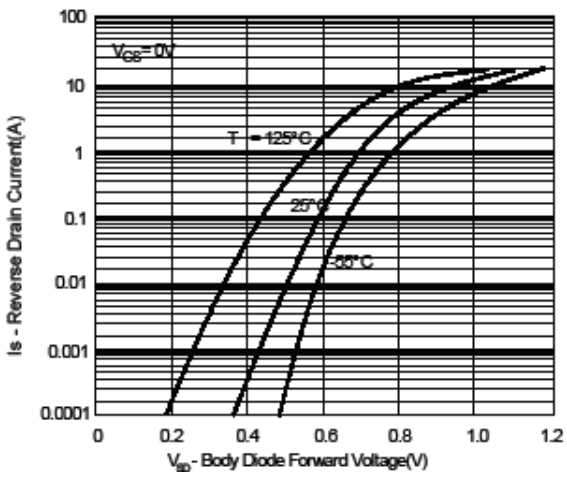
On-Resistance Variation with Gate-to-Source Voltage



Transfer Characteristics



Body Diode Forward Voltage Variation with Source Current and Temperature



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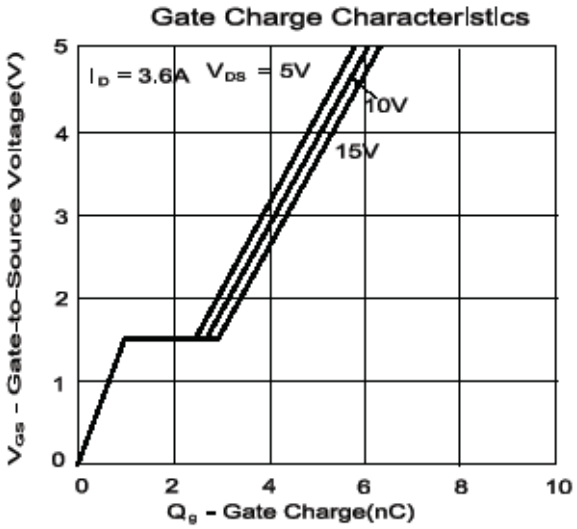
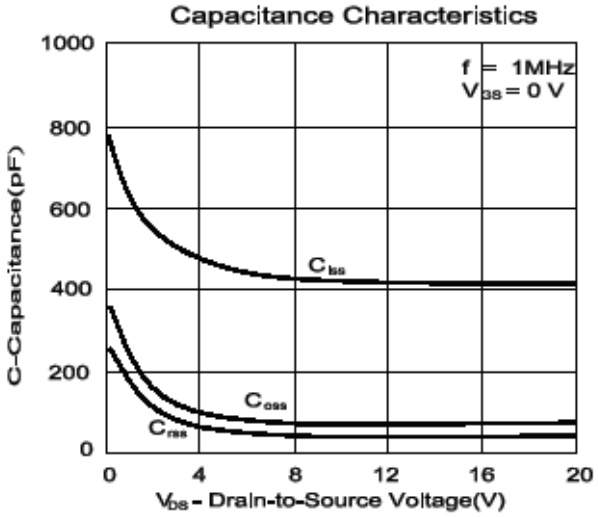
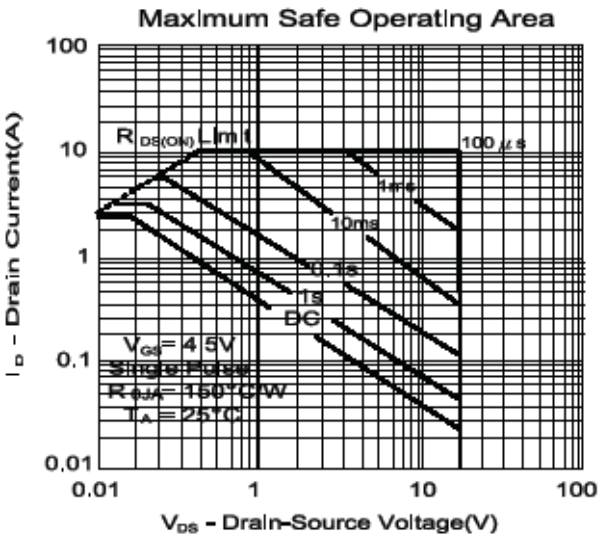
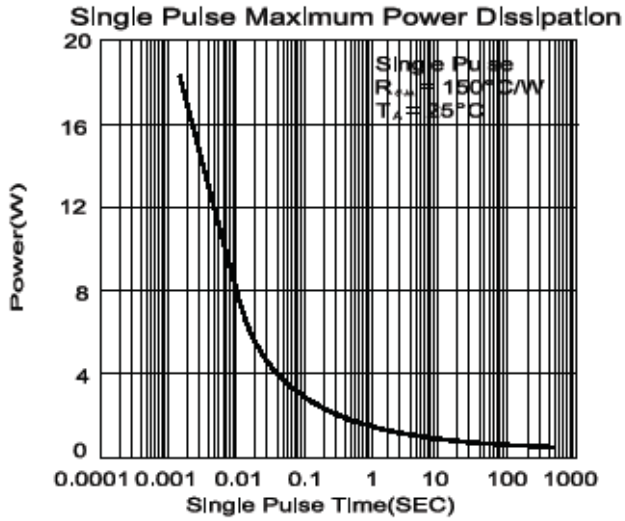


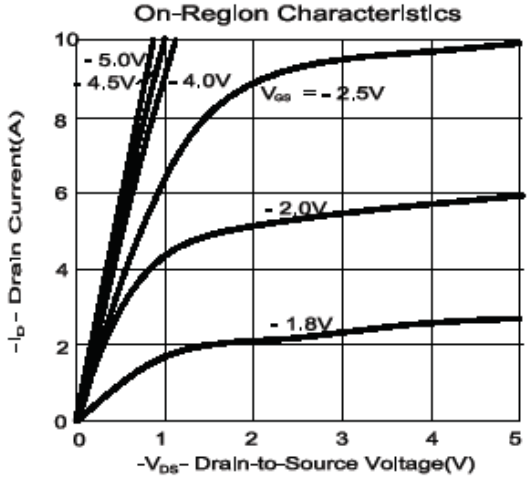




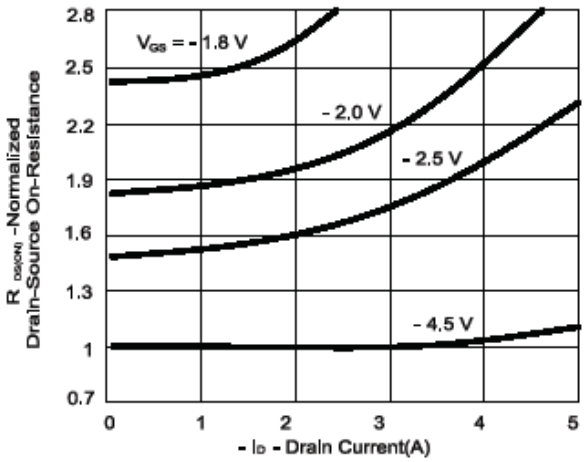


◆ TYPICAL CHARACTERICTICS (P-Channel)

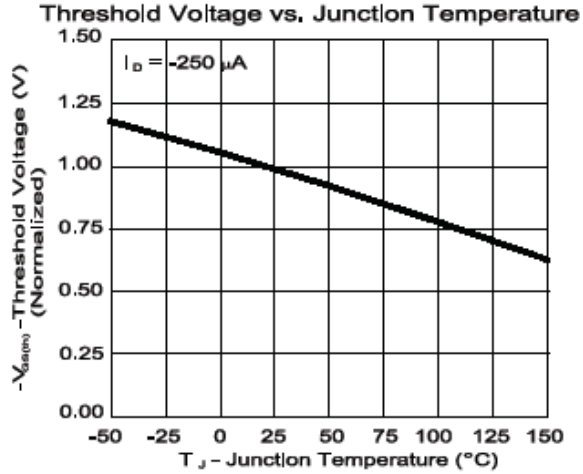
On-Region Characteristics



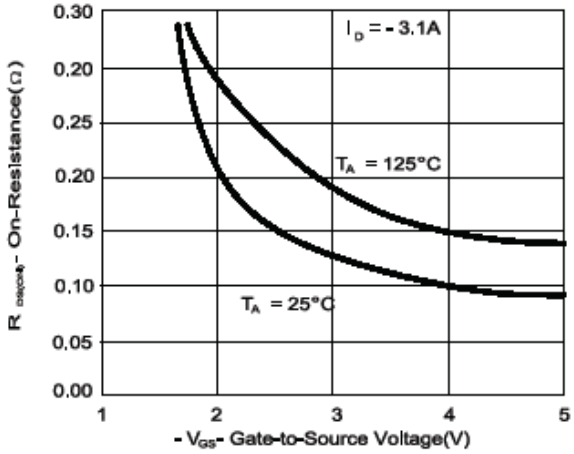
On-Resistance Variation with Drain Current and Gate Voltage



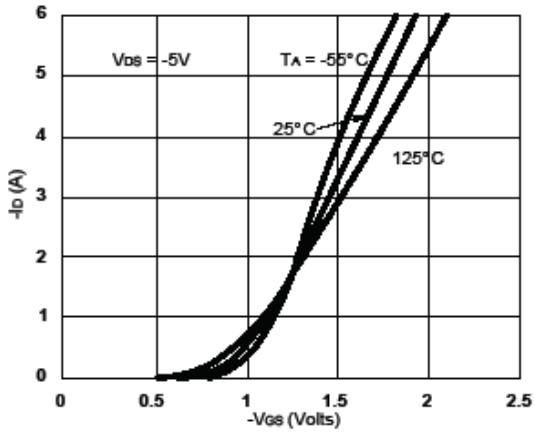
Threshold Voltage vs. Junction Temperature



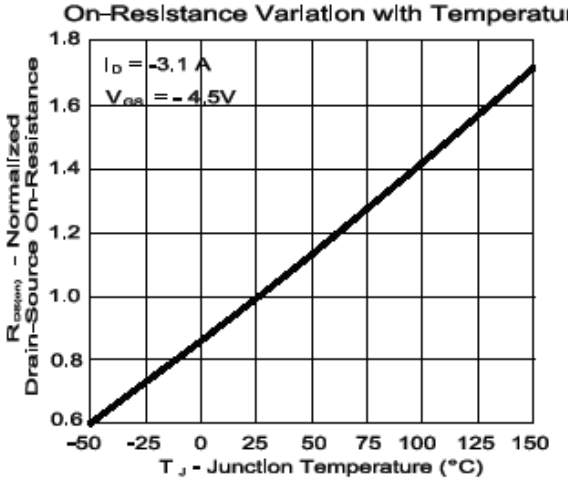
On-Resistance Variation with Gate-to-Source Voltage



Transfer Characteristics

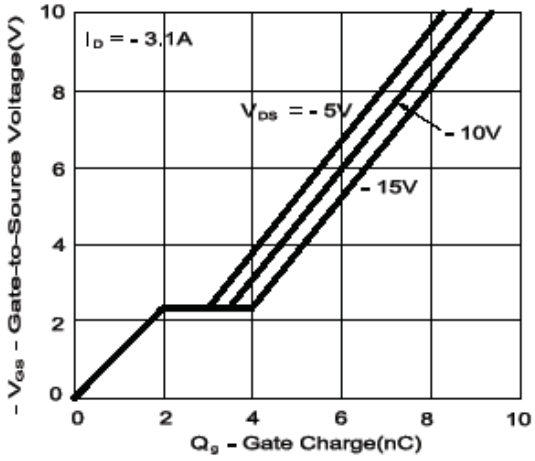


On-Resistance Variation with Temperature

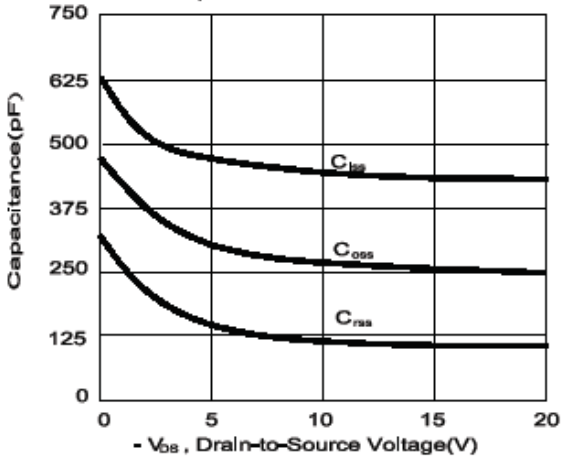


◆ TYPICAL CHARACTERICTICS (P-Channel)

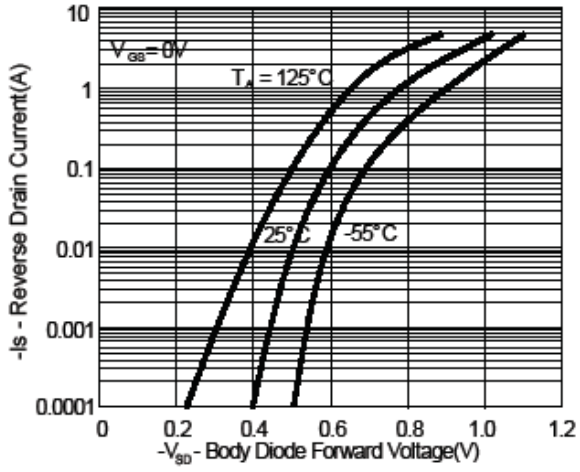
Gate Charge Characteristics



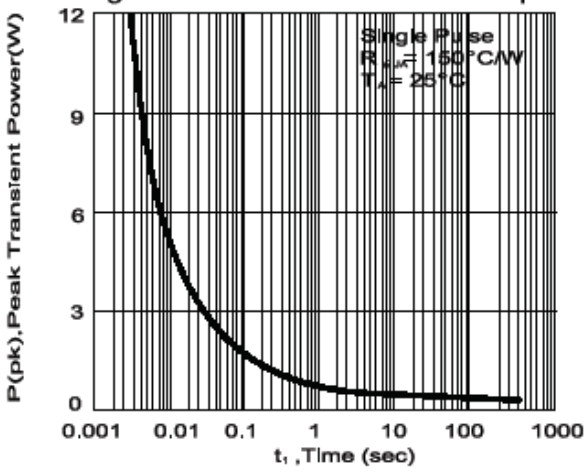
Capacitance Characteristics



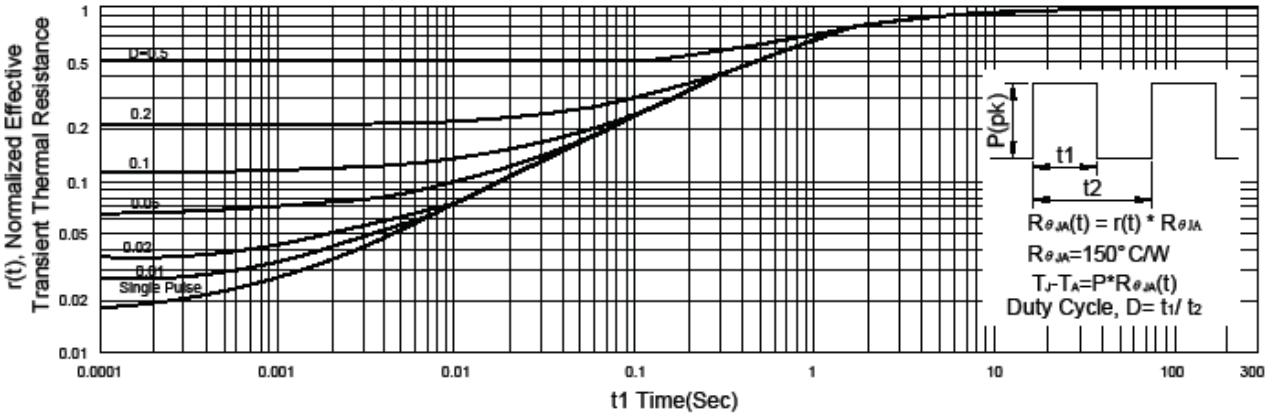
Body Diode Forward Voltage Variation with Source Current and Temperature



Single Pulse Maximum Power Dissipation



Transient Thermal Response Curve.



◆ PHYSICAL DIMENSIONS

TSOP-6

Dimension	mm			Dimension	mm		
	Min.	Typ.	Max.		Min.	Typ.	Max.
A		0.95		H	0.08	0.13	0.2
B	2.5	2.8	3.1	I	0.3		0.6
C	1.5	1.6	1.7	J			
D	2.7	2.9	3.1	K			
E	0.7		1.2	L			
F	0		0.15	M			
G	0.3	0.4	0.5	N