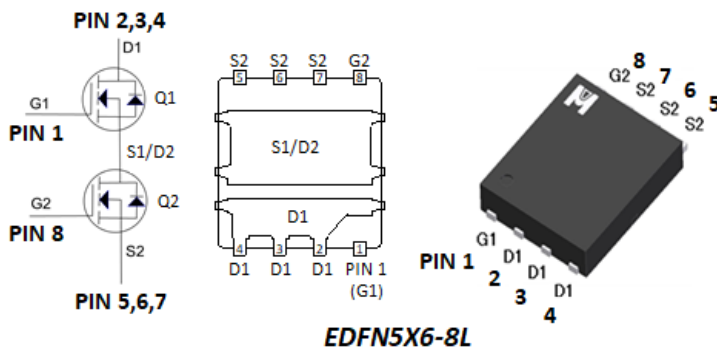


Dual N-Channel Logic Level Enhancement Mode Field Effect Transistor

•Product Summary:

	Q1	Q2
BV_{DSS}	30V	30V
$R_{DS(on)} (MAX.) @ V_{GS}=10V$	6.6m Ω	2.4m Ω
$R_{DS(on)} (MAX.) @ V_{GS}=4.5V$	8.8m Ω	3.4m Ω
$I_D @ T_C=25^{\circ}C$	62A	171A
$I_D @ T_A=25^{\circ}C$	20A	38A

• Pin Description:



Dual N Channel MOSFET

UIS, Rg 100% Tested

RoHS & Halogen Free & TSCA Compliant

•ABSOLUTE MAXIMUM RATINGS ($T_C = 25^{\circ}C$ Unless Otherwise Noted)



PARAMETERS/TEST CONDITIONS		SYMBOL	LIMITS		UNIT
			Q1	Q2	
Gate-Source Voltage		V_{GS}	± 20	± 20	V
Continuous Drain Current	$T_C = 25^{\circ}C$	I_D	62	171	A
	$T_C = 100^{\circ}C$		39	108	
Continuous Drain Current	$T_A = 25^{\circ}C$	I_D	20	38	
	$T_A = 70^{\circ}C$		16	30	
Pulsed Drain Current ¹		I_{DM}	114	294	mJ
Avalanche Current		I_{AS}	34	65	
Avalanche Energy		EAS	57.8	211.3	
Repetitive Avalanche Energy ²		EAR	28.9	105.6	W
Power Dissipation	$T_C = 25^{\circ}C$	P_D	48	125	
	$T_C = 100^{\circ}C$		19	50	W
Power Dissipation	$T_A = 25^{\circ}C$	P_D	5.2	6.3	
	$T_A = 70^{\circ}C$		3.3	4.0	
Operating Junction & Storage Temperature Range		T_J, T_{stg}	-55 to 150		$^{\circ}C$

• 100% UIS testing in condition of $V_D=25V$, $L=0.1mH$, $V_G=10V$, $I_L=21A$, $R_G=25\Omega$, Rated $V_{DS}=30V$ N-CH_Q1

• 100% UIS testing in condition of $V_D=25V$, $L=0.1mH$, $V_G=10V$, $I_L=39A$, $R_G=25\Omega$, Rated $V_{DS}=30V$ N-CH_Q2

•THERMAL RESISTANCE RATINGS

THERMAL RESISTANCE		SYMBOL	TYPICAL	MAXIMUM		UNIT
				Q1	Q2	
Junction-to-Case		$R_{\theta JC}$		2.6	1.0	$^{\circ}C/W$
Junction-to-Ambient ³	$t \leq 10s$	$R_{\theta JA}$		24	20	
	Steady-State	$R_{\theta JA}$		58	52	

¹Pulse width limited by maximum junction temperature.

²Duty cycle $< 1\%$

³The value of $R_{\theta JA}$ is measured with the device mounted on 1in² FR-4 board with 2oz. Copper, in a still air environment with $T_A = 25^{\circ}C$.

⁴Guarantee by Engineering test

▪ Q1_ELECTRICAL CHARACTERISTICS (T_J = 25 °C, Unless Otherwise Noted)

PARAMETER	SYMBOL	TEST CONDITIONS	LIMITS			UNIT
			MIN	TYP	MAX	
STATIC						
Drain-Source Breakdown Voltage ⁴	V _{(BR)DSS}	V _{GS} = 0V, I _D = 250μA	30			V
Gate Threshold Voltage ⁴	V _{GS(th)}	V _{DS} = V _{GS} , I _D = 250μA	1.2	1.6	2.5	
Gate-Body Leakage ⁴	I _{GSS}	V _{DS} = 0V, V _{GS} = ±20V			±100	nA
Zero Gate Voltage Drain Current ⁴	I _{DSS}	V _{DS} = 30V, V _{GS} = 0V			1	μA
		V _{DS} =30V, V _{GS} =0V, T _J = 125 °C			25	
On-State Drain Current ¹	I _{D(ON)}	V _{DS} = 10V, V _{GS} = 10V	62			A
Drain-Source On-State Resistance ^{1,4}	R _{DS(ON)}	V _{GS} = 10V, I _D = 20A		5.8	6.6	mΩ
		V _{GS} = 4.5V, I _D = 20A		7.7	8.8	
Forward Transconductance ¹	g _{fs}	V _{DS} = 5V, I _D = 15A		49		S
DYNAMIC						
Input Capacitance ⁵	C _{iss}	V _{GS} = 0V, V _{DS} = 15V, f = 1MHz		920		pF
Output Capacitance ⁵	C _{oss}			155		
Reverse Transfer Capacitance ⁵	C _{rss}			100		
Gate Resistance ^{4,5}	R _g	f = 1MHz		0.7		Ω
Total Gate Charge ^{1,2,5}	Q _g (V _{GS} =10V)	V _{DS} = 15V, V _{GS} = 10V, I _D = 20A		20		nC
	Q _g (V _{GS} =4.5V)			8.8		
Gate-Source Charge ^{1,2,5}	Q _{gs}			3.5		
Gate-Drain Charge ^{1,2,5}	Q _{gd}			3.2		
Turn-On Delay Time ^{1,2,5}	t _{d(on)}	V _{DS} = 15V, V _{GS} = 10V, I _D = 5A , R _g = 3Ω		6.3		nS
Rise Time ^{1,2,5}	t _r			11		
Turn-Off Delay Time ^{1,2,5}	t _{d(off)}			17		
Fall Time ^{1,2,5}	t _f			7.2		
SOURCE-DRAIN DIODE RATINGS AND CHARACTERISTICS						
Continuous Current	I _S				40	A
Pulsed Current ³	I _{SM}				114	
Forward Voltage ^{1,4}	V _{SD}	I _F = 20A, V _{GS} = 0V			1.2	V
Reverse Recovery Time ⁵	t _{rr}	I _F = 20A, dI _F /dt = 400A / μS		7.2		nS
Peak Reverse Recovery Current ⁵	I _{RM(REC)}			1.9		A
Reverse Recovery Charge ⁵	Q _{rr}			7.4		nC

¹Pulse test : Pulse Width ≤ 300 usec, Duty Cycle ≤ 2%.

²Independent of operating temperature.

³Pulse width limited by maximum junction temperature.

⁴Guarantee by FT test Item

⁵Guarantee by Engineering test

EMC will review datasheet by quarter, and update new version.



•Q1_TYPICAL CHARACTERISTICS

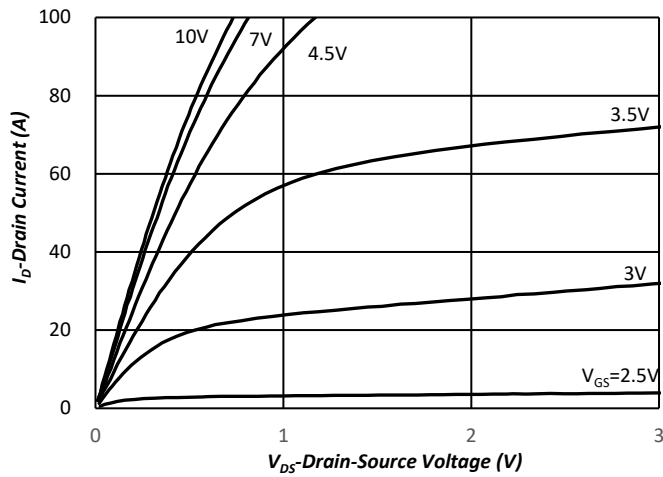


Fig.1 Typical Output Characteristics

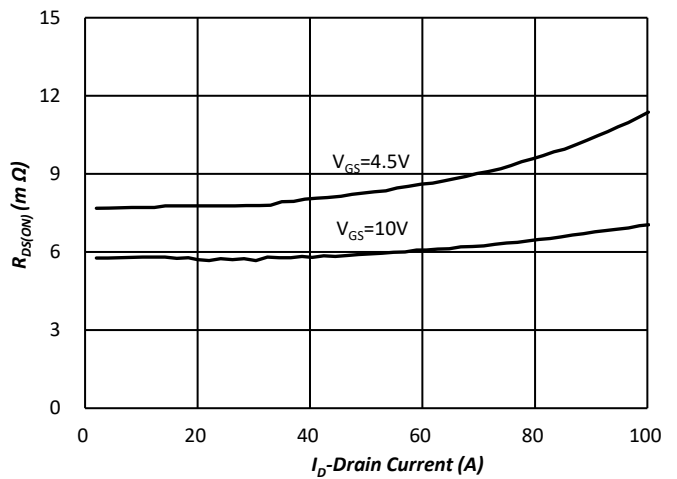


Fig.2 On-Resistance Variation with Drain Current and Gate Voltage

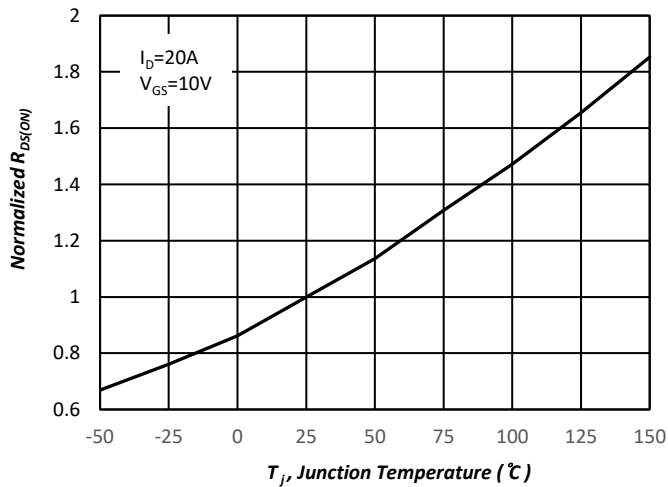


Fig.3 Normalized On-Resistance v.s. Junction Temperature

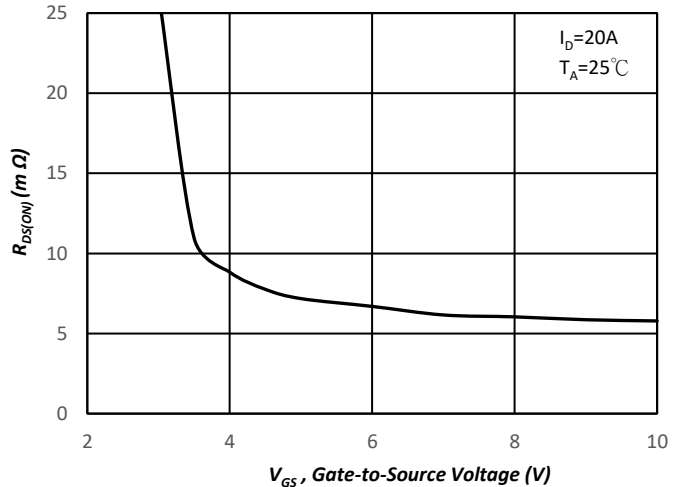


Fig.4 On-Resistance v.s. Gate Voltage

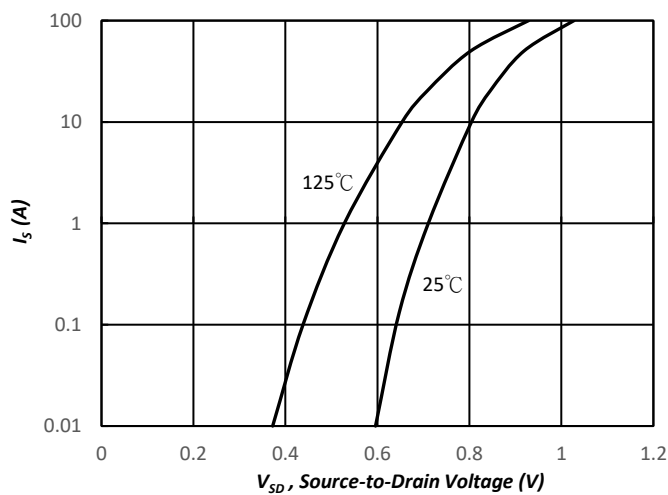


Fig.5 Forward Characteristic of Reverse Diode

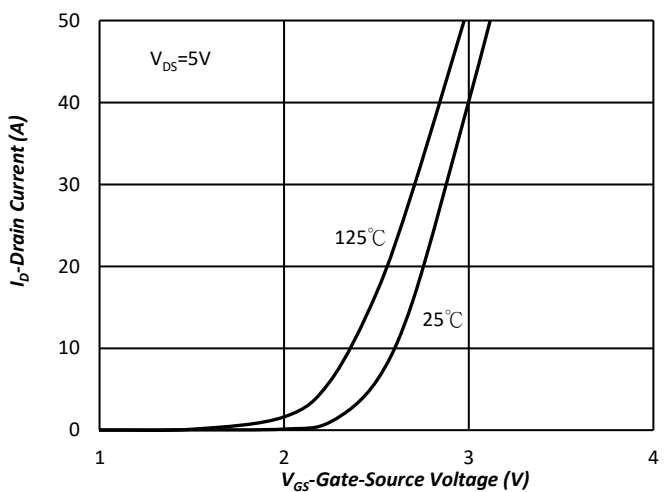


Fig.6 Transfer Characteristics

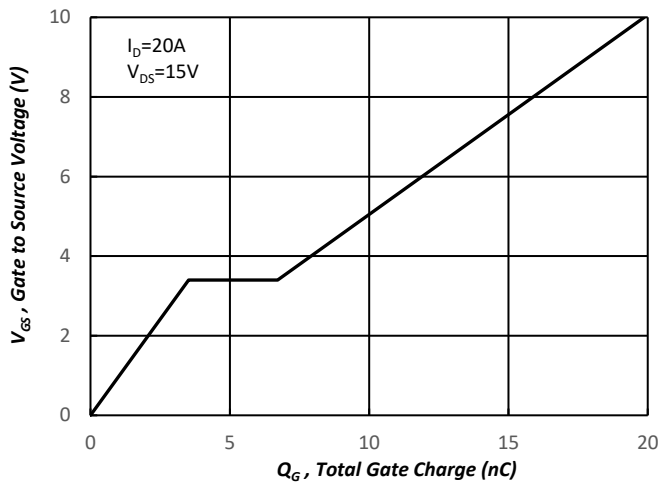


Fig.7 Gate Charge Characteristics

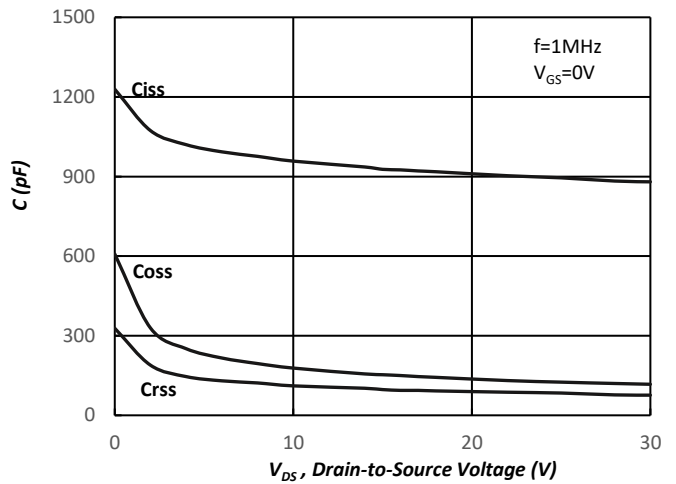


Fig.8 Typical Capacitance Characteristics

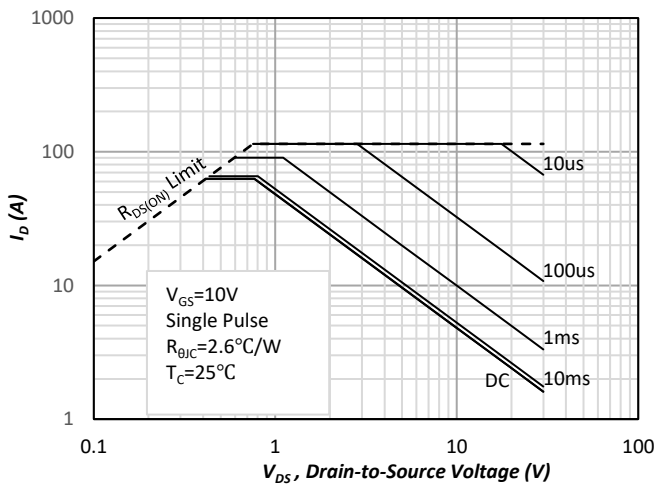


Fig.9. Maximum Safe Operating Area

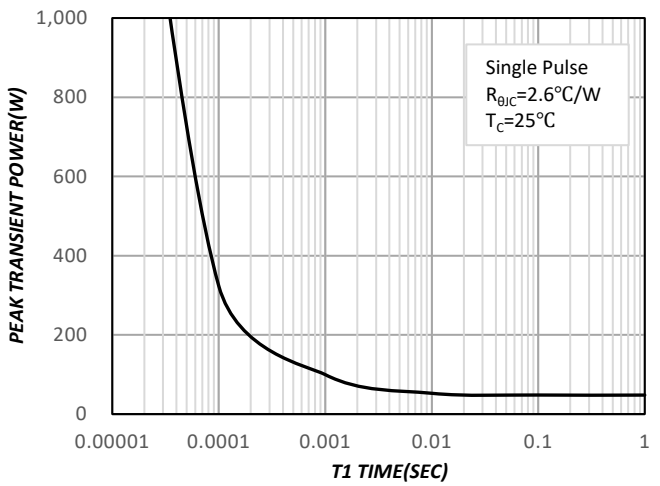


Fig.10. Single Pulse Maximum Power Dissipation

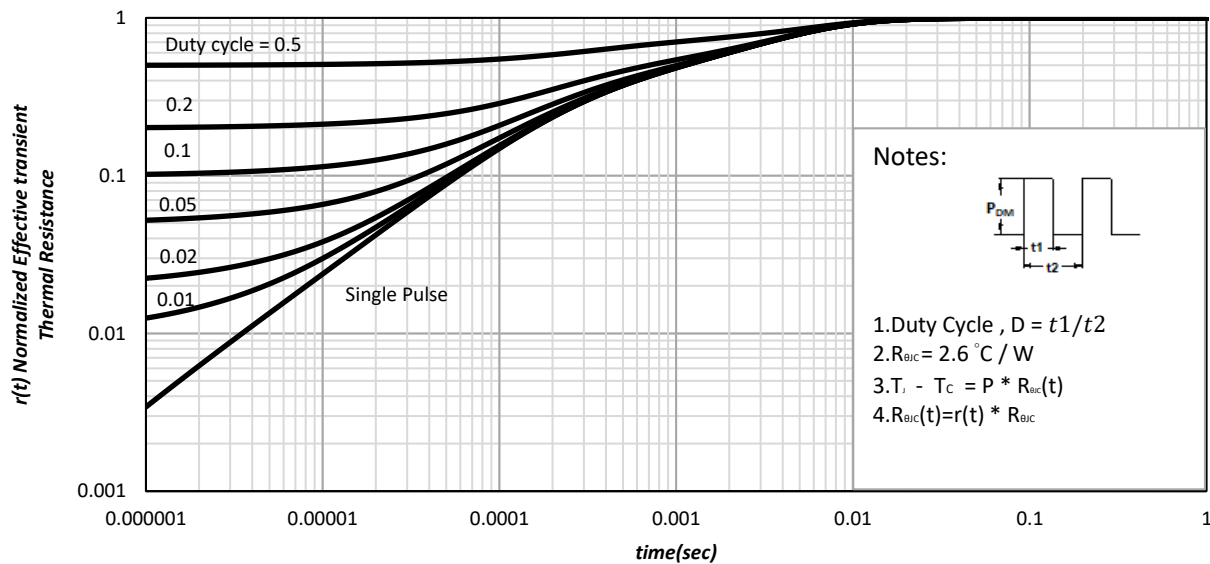


Fig.11. Effective Transient Thermal Impedance

▪ Q2_ELECTRICAL CHARACTERISTICS (T_J = 25 °C, Unless Otherwise Noted)

PARAMETER	SYMBOL	TEST CONDITIONS	LIMITS			UNIT
			MIN	TYP	MAX	
STATIC						
Drain-Source Breakdown Voltage ⁴	V _{(BR)DSS}	V _{GS} = 0V, I _D = 250μA	30			V
Gate Threshold Voltage ⁴	V _{GS(th)}	V _{DS} = V _{GS} , I _D = 250μA	1.2	1.6	2.5	
Gate-Body Leakage ⁴	I _{GSS}	V _{DS} = 0V, V _{GS} = ±20V			±100	nA
Zero Gate Voltage Drain Current ⁴	I _{DSS}	V _{DS} = 30V, V _{GS} = 0V			1	μA
		V _{DS} =30V, V _{GS} =0V, T _J = 125 °C			25	
On-State Drain Current ¹	I _{D(ON)}	V _{DS} = 10V, V _{GS} = 10V	171			A
Drain-Source On-State Resistance ^{1,4}	R _{DS(ON)}	V _{GS} = 10V, I _D = 20A		1.8	2.4	mΩ
		V _{GS} = 4.5V, I _D = 20A		2.5	3.4	
Forward Transconductance ¹	g _{fs}	V _{DS} = 5V, I _D = 10A		97		S
DYNAMIC						
Input Capacitance ⁵	C _{iss}	V _{GS} = 0V, V _{DS} = 15V, f = 1MHz		3000		pF
Output Capacitance ⁵	C _{oss}			440		
Reverse Transfer Capacitance ⁵	C _{rss}			290		
Gate Resistance ^{4,5}	R _g	f = 1MHz		1.3		Ω
Total Gate Charge ^{1,2,5}	Q _g (V _{GS} =10V)	V _{DS} = 15V, V _{GS} = 10V, I _D = 20A		62		nC
	Q _g (V _{GS} =4.5V)			30		
Gate-Source Charge ^{1,2,5}	Q _{gs}			10		
Gate-Drain Charge ^{1,2,5}	Q _{gd}			12		
Turn-On Delay Time ^{1,2,5}	t _{d(on)}	V _{DS} = 15V, V _{GS} = 10V, I _D = 5A , R _g = 3Ω		11		nS
Rise Time ^{1,2,5}	t _r			15		
Turn-Off Delay Time ^{1,2,5}	t _{d(off)}			49		
Fall Time ^{1,2,5}	t _f			26		
SOURCE-DRAIN DIODE RATINGS AND CHARACTERISTICS						
Continuous Current	I _S				104	A
Pulsed Current ³	I _{SM}				294	
Forward Voltage ^{1,4}	V _{SD}	I _F = 20A, V _{GS} = 0V			1.2	V
Reverse Recovery Time ⁵	t _{rr}	I _F = 20A, dI _F /dt = 400A / μS		17		nS
Peak Reverse Recovery Current ⁵	I _{RM(REC)}			2.5		A
Reverse Recovery Charge ⁵	Q _{rr}			23		nC

¹Pulse test : Pulse Width ≤ 300 usec, Duty Cycle ≤ 2%.

²Independent of operating temperature.

³Pulse width limited by maximum junction temperature.

⁴Guarantee by FT test Item

⁵Guarantee by Engineering test

EMC will review datasheet by quarter, and update new version.



•Q2_TYPICAL CHARACTERISTICS

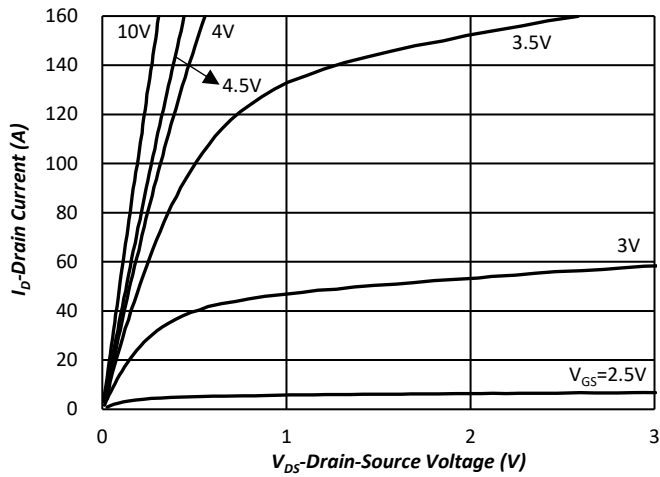


Fig.1 Typical Output Characteristics

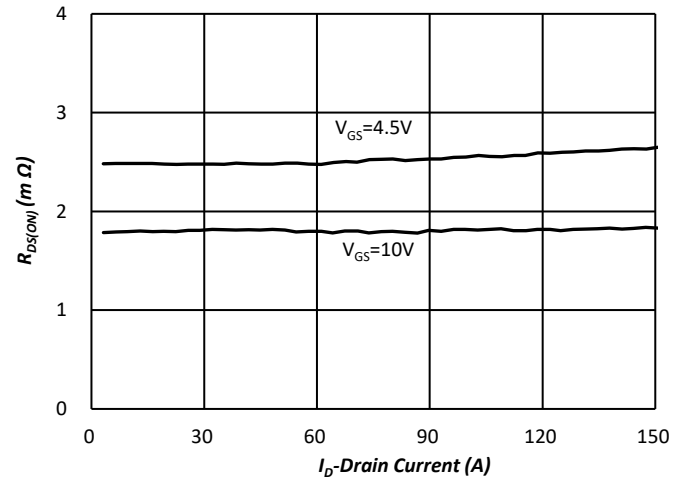


Fig.2 On-Resistance Variation with Drain Current and Gate Voltage

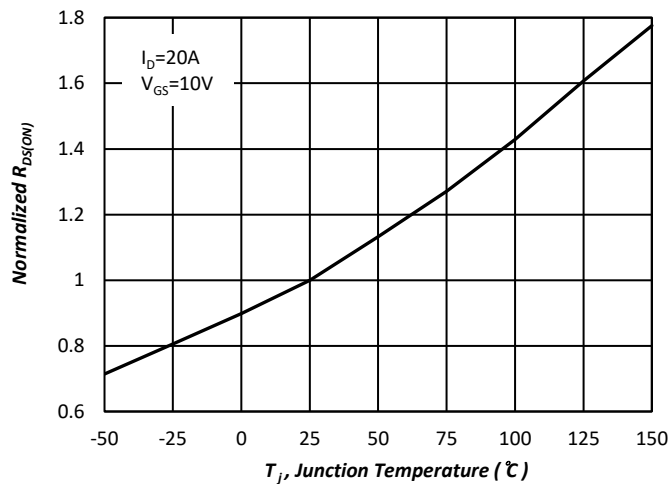


Fig.3 Normalized On-Resistance v.s. Junction Temperature

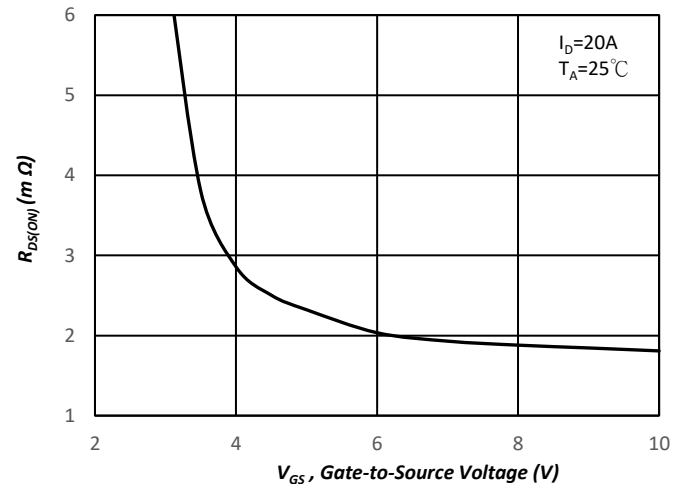


Fig.4 On-Resistance v.s. Gate Voltage

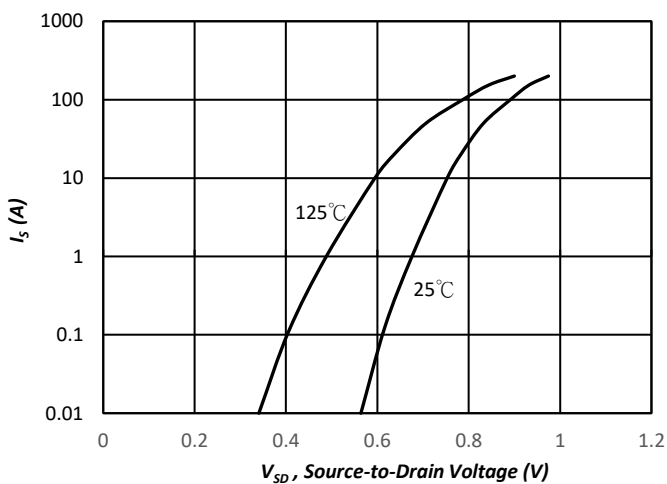


Fig.5 Forward Characteristic of Reverse Diode

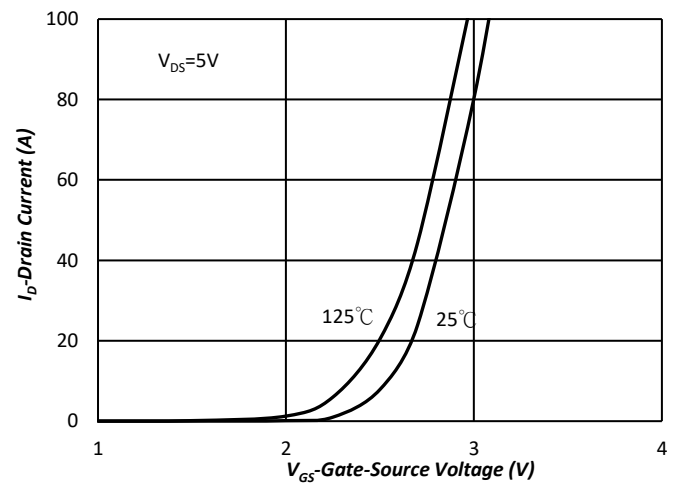


Fig.6 Transfer Characteristics

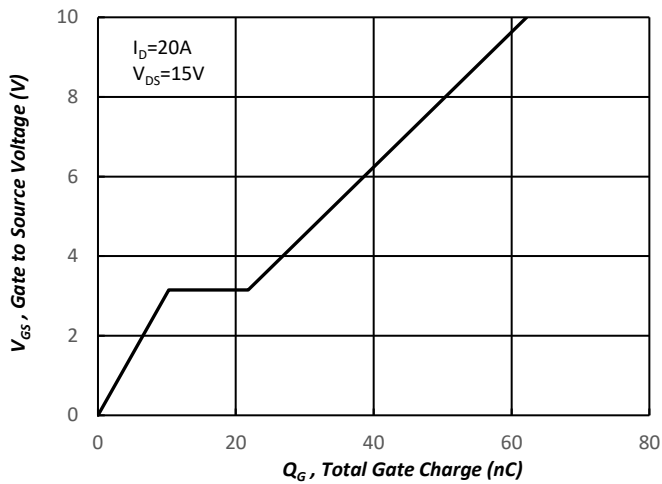


Fig.7 Gate Charge Characteristics

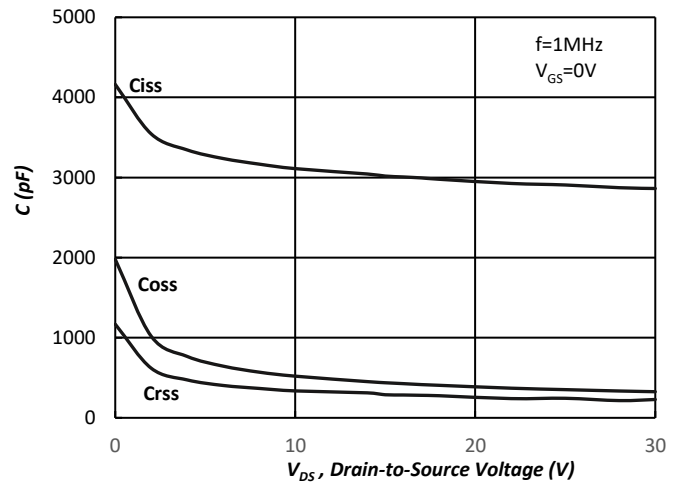


Fig.8 Typical Capacitance Characteristics

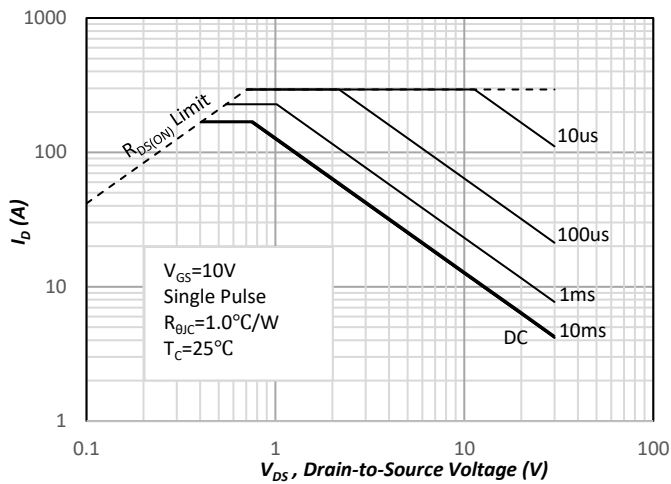


Fig.9. Maximum Safe Operating Area

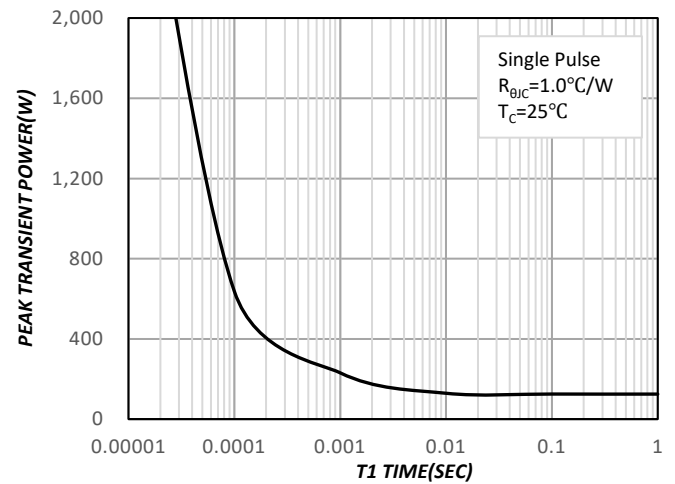


Fig.10. Single Pulse Maximum Power Dissipation

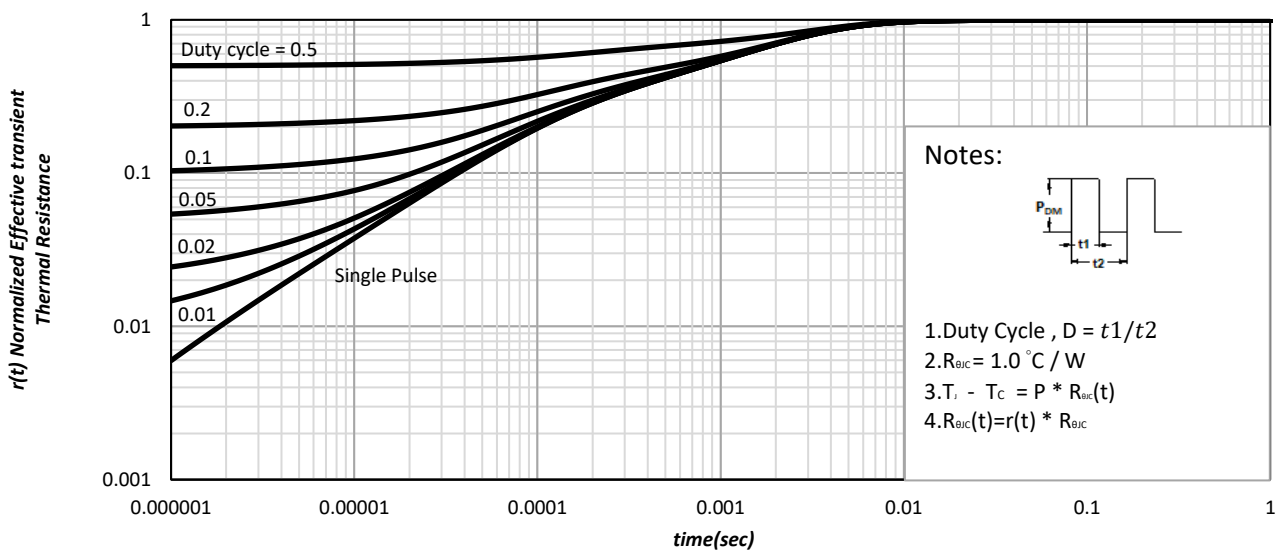


Fig.11. Effective Transient Thermal Impedance

Ordering & Marking Information:

Device Name: EMP19K03HPC for Asymmetric EDFN5X6-8L



P19K03: Device Name

ABCDEFGH: Date Code

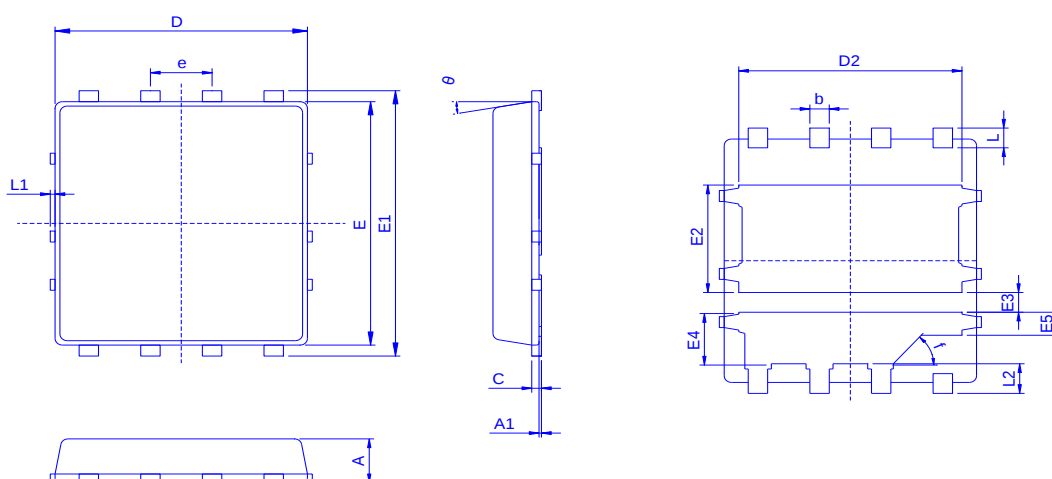
A: Assembly House

B: Year(A:2008 B:2009 C:2010....)

C: Month(A:01 B:02 C:03 D:04 E:05 F:06 G:07 H:08 I:09 J:10 K:11 L:12)

DEFG: Serial No.

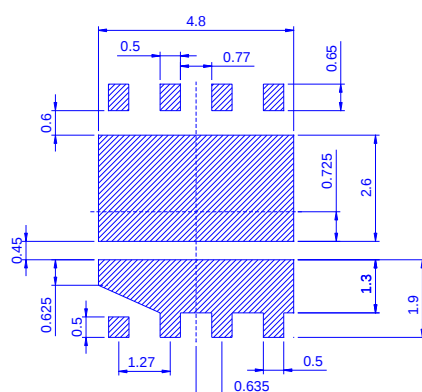
Outline Drawing



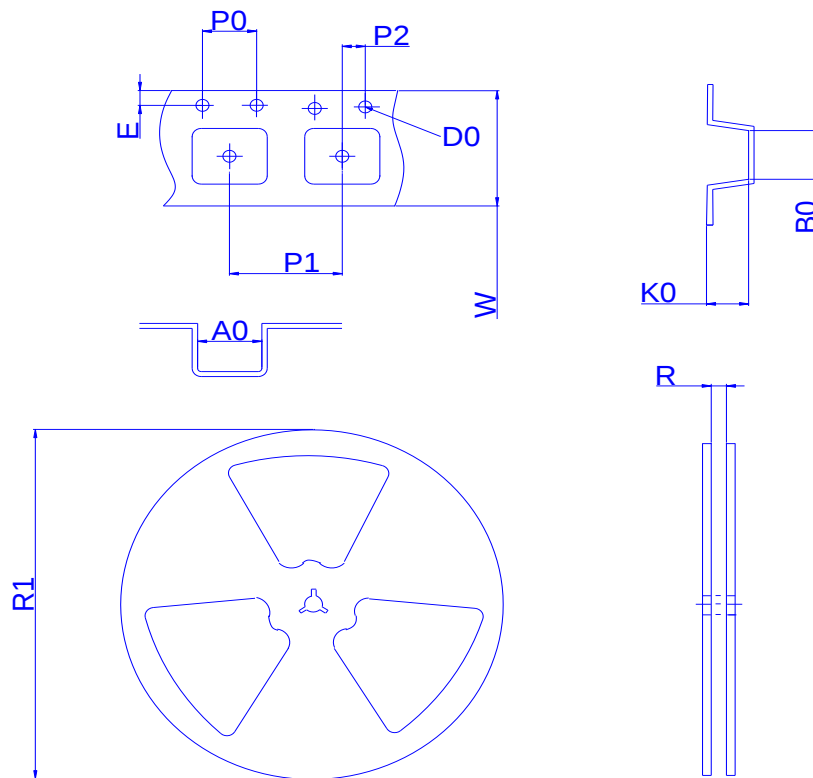
Dimension	A	A1	b	c	D	D2	E	E1	E2	E3	E4	E5	e
Min.	0.85	-	0.33	0.15	4.80	3.61	5.55	5.90	2.02	0.40	1.10	0.48	-
Typ.	0.90	-	0.40	0.20	4.90	3.81	5.65	6.00	2.17	0.45	1.18	0.53	1.27
Max.	1.10	0.05	0.51	0.30	5.40	4.70	5.80	6.10	2.50	0.60	1.42	0.58	-

Dimension	L	L1	L2	θ
Min.	0.35	-	0.48	0°
Typ.	0.45	-	0.58	
Max.	0.71	0.10	0.81	12°

Footprint



◆ Tape&Reel Information:2500pcs/Reel



Package	EDFN5X6-8L
Reel	13"
Device orientation	FEED DIRECTION

Dimension in mm

Dimension	Carrier tape									Reel	
	A0	B0	D0	E	K0	P0	P1	P2	W	R	R1
Typ.	6.4	5.3	1.5	1.8	1.6	4	8	2	12	12.4	330
±	0.2	0.2	0.1	0.1	0.6	0.1	0.1	0.1	0.3	2	2