

F5045P

FUJI High-side IPS

High-side Intelligent Power Switch

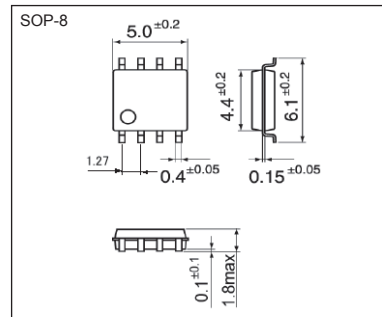
Features

- Low minimum operating voltage(min.3V)
- Low stand by current
- Two input terminals (for on state hold)
- Over current detection
- Over temperature shutdown
- High speed switching

Applications

- Main relay driver

Outline drawings [mm]



Connection

TERMINAL No.	FUNCTION	SYMBOL
①	OUTPUT	OUT
②	GROUND	GND
③	STATUS	ST
④	INPUT	IN
⑤ ⑥ ⑦ ⑧	SUPPLY VOLTAGE	V _{cc}

Maximum ratings and characteristics

Absolute maximum ratings (at T_c=25°C)

Description	Symbol	Characteristics	Unit	Remarks
Supply voltage	V _{cc}	50	V	Pulse 0.25 sec
		33	V	DC
Continuous drain current	I _D	1.0	A	*
Input voltage	V _{IN}	-0.3~V _{cc} +0.3	V	DC
Maximum power dissipation	P _D	1.5	W	*
Operating junction temperature	T _j	150	°C	-
Storage temperature range	T _{stg}	-55~150	°C	-
Single pulse inductive load switch-off energy dissipation	E _{CL}	25	mJ	T _j =150°C, L=50mH, Single pulse, dv/dt≤10V/us

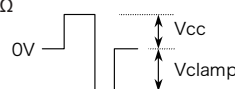
* Surface mounted on 1000mm² PCB(FR-4)

Electrical characteristics (at T_c=25°C, unless otherwise specified.)

Description	Symbol	Conditions	min.	typ.	max.	Unit
Operating voltage	V _{cc} **	R _L =26Ω	2.87	-	33	V
Standby current	I _{cc}	V _{cc} =13V, R _L =26Ω, V _{IN1} =V _{IN2} =0V	-	-	130	μA
Input voltage	V _{IN} (H)	V _{cc} =3~5V	0.7xV _{cc}	-	-	V
	V _{IN} (L)	V _{cc} =3~5V	-	-	0.3xV _{cc}	V
	V _{IN} (H)	V _{cc} >5V	3.5	-	-	V
	V _{IN} (L)	V _{cc} >5V	-	-	1.5	V
Input current 1	I _{IN} (H)1	V _{cc} =13V, V _{IN1} =5V	-	-	100	μA
Input current 2	I _{IN} (H)2	V _{cc} =13V, V _{IN2} =5V	-	-	100	μA
On-state resistance	R _{DS(on)}	V _{cc} =13V, I _L =0.5A	-	-	0.6	Ω
Output leakage current	I _{OL}	V _{cc} =13V	-	-	80	μA
Over current detection	I _{OC}	V _{cc} =13V	2	-	-	A
Over-temperature shutdown	T _{trip}	V _{cc} =13V	150	-	-	°C
Turn-on time	T _{on}	V _{cc} =13V, R _L =26Ω	-	-	120	μs
Turn-off time	T _{off}	V _{cc} =13V, R _L =26Ω	-	-	40	μs
Output-clamp voltage	V _{clamp} ***	V _{cc} =13V, I _L =0.5A, V _{IN1} =V _{IN2} =0V, L=10mH	-(50-V _{cc})	-	-(60-V _{cc})	V
Diode forward on-voltage	V _{SD}	V _{IN1} =V _{IN2} =0V, I _{SD} =-1A	-	-	1.5	V

** Minimum of operating voltage is defined as the voltage of R_{DS(on)} = 2.45Ω

*** <Output-clamp voltage: V_{clamp}> 50V≤V_{CC}+V_{clamp}≤60V (T_c=25°C) ←

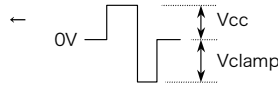


● Electrical characteristics (at Tc=-40~105°C, unless otherwise specified.)

Description	Symbol	Conditions	min.	typ.	max.	Unit
Operating voltage	V _{cc} **	R _L =26Ω	3	-	33	V
Standby current	I _{cc}	V _{cc} =13V, R _L =26Ω, V _{IN1} =V _{IN2} =0V	-	-	150	μA
Input voltage	V _{IN(H)}	V _{cc} =3~5V	0.7xV _{cc}	-	-	V
	V _{IN(L)}	V _{cc} =3~5V	-	-	0.3xV _{cc}	V
	V _{IN(H)}	V _{cc} >5V	3.5	-	-	V
	V _{IN(L)}	V _{cc} >5V	-	-	1.5	V
Input current 1	I _{IN(H)1}	V _{cc} =13V, V _{IN1} =5V	-	-	110	μA
Input current 2	I _{IN(H)2}	V _{cc} =13V, V _{IN1} =5V	-	-	110	μA
On-state resistance	R _{DS(on)}	V _{cc} =13V, I _L =0.5A	-	-	1.0	Ω
Output leakage current	I _{OL}	V _{cc} =13V	-	-	92	μA
Over current detection	I _{OC}	V _{cc} =13V	1.3	-	-	A
Turn-on time	T _{on}	V _{cc} =13V, R _L =26Ω	-	-	140	μs
Turn-off time	T _{off}	V _{cc} =13V, R _L =26Ω	-	-	45	μs
Output-clamp voltage	V _{clamp} ***	V _{cc} =13V, I _L =0.5A, V _{IN1} =V _{IN2} =0V, L=10mH	-(48.4-V _{cc})	-	-(61.8-V _{cc})	V
Diode forward on-voltage	V _{SD}	V _{IN1} =V _{IN2} =0V, I _{SD} =-1A	-	-	1.8	V

** Minimum of operating voltage is defined as the voltage of R_{DS(on)} = 2.45Ω

*** <Output-clamp voltage: V_{clamp}> 50V≤V_{CC}+V_{clamp}≤60V (Tc=25°C)



● Thermal characteristics

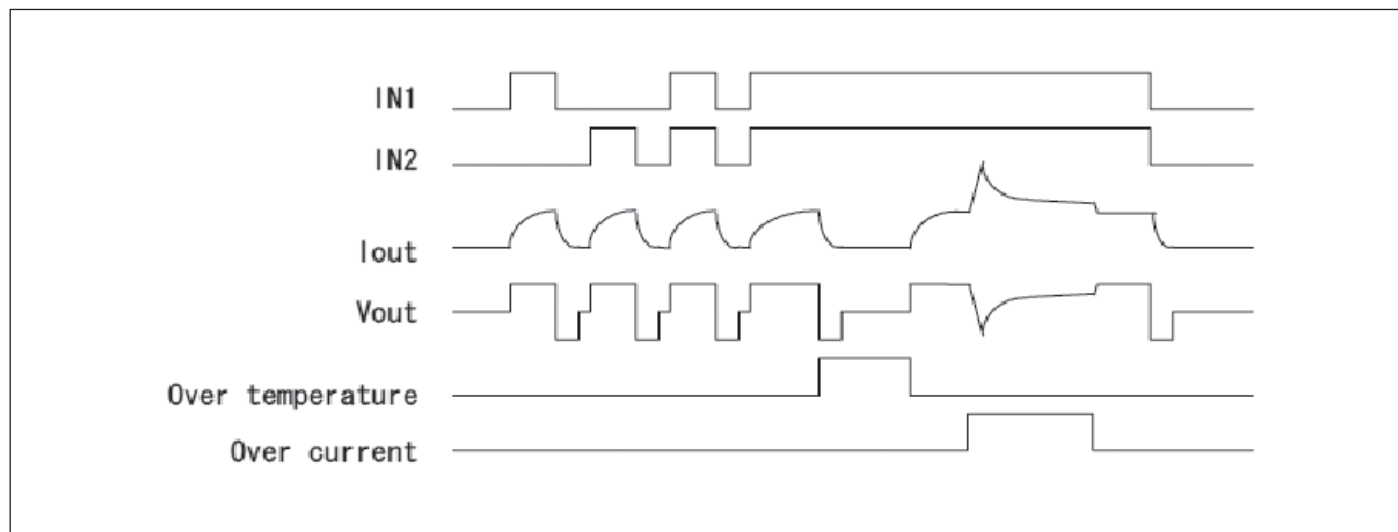
Description	Symbol	Test conditions	min.	typ.	max.	Unit
Thermal resistance	R _{th(j-a)}	Junction - ambient****	-	-	83.0	°C/W

**** Surface mounted on 1000mm² PCB (FR-4)

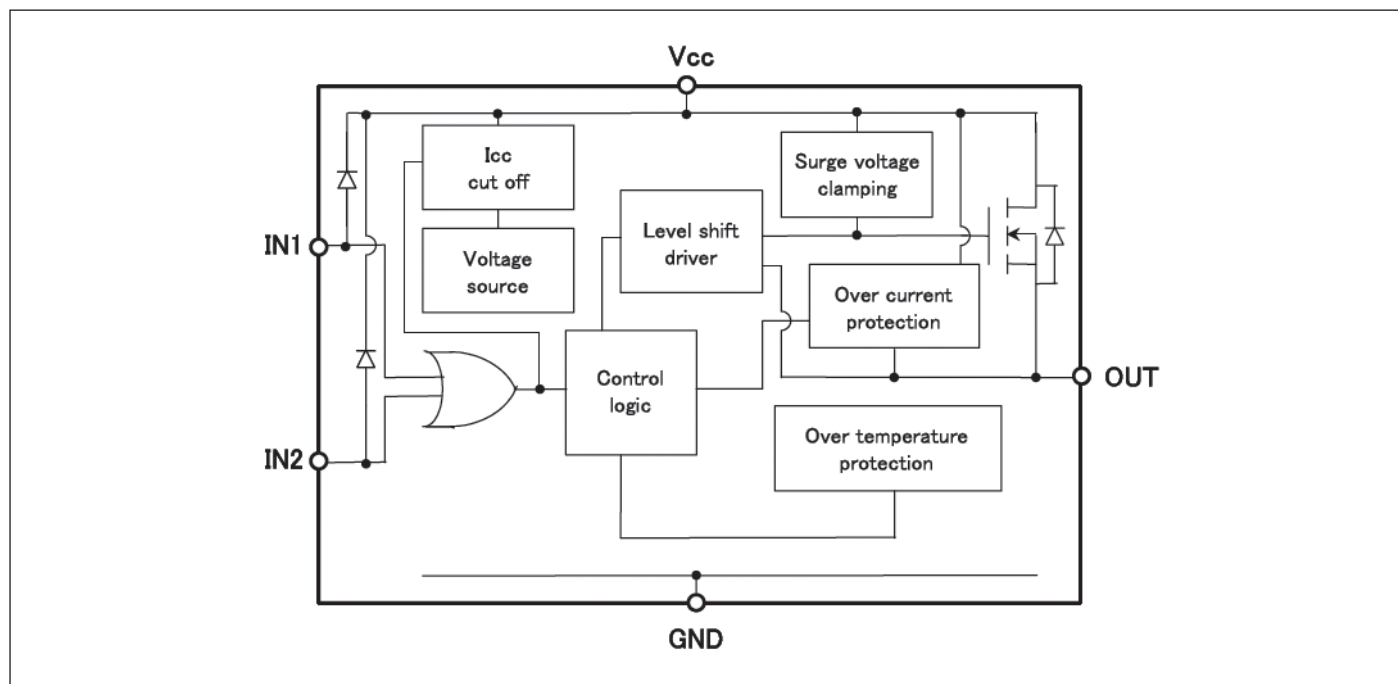
● Truth table

	Input1 voltage	Input2 voltage	Output voltage	Remarks
Normal operation	L	L	L	-
	L	H	H	
	H	L	H	
	H	H	H	
Over-current	L	L	L	Auto-restart *Current-limiting mode
	L	H	*	
	H	H	*	
Over-temperature	L	L	L	Auto-restart
	L	H	L	
	H	H	L	
Over of input terminals	Open	Open	L	"Open" means "L" level, because of pull-down circuit.
	Open	L	L	
	L	Open	L	
	Open	H	H	
	H	Open	H	

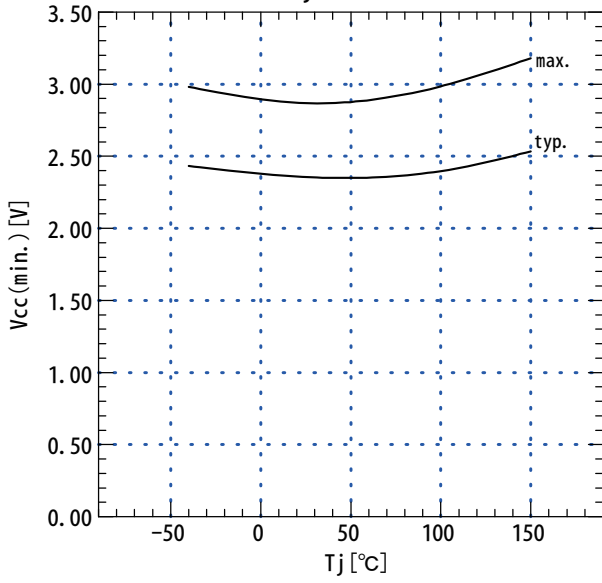
■ Timing chart



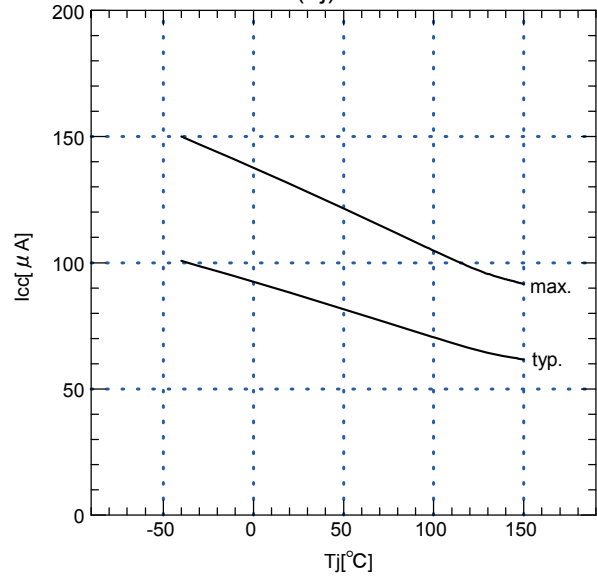
■ Circuit block diagram



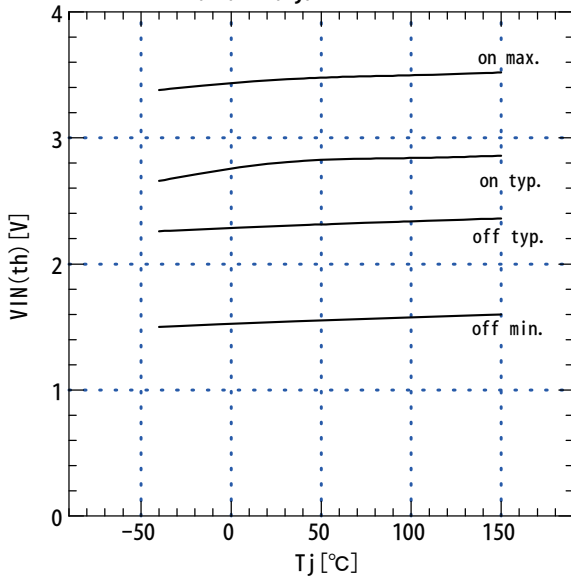
Minimum operation voltage
 $V_{cc(min.)} = f(T_j) : R_L = 26 \Omega$



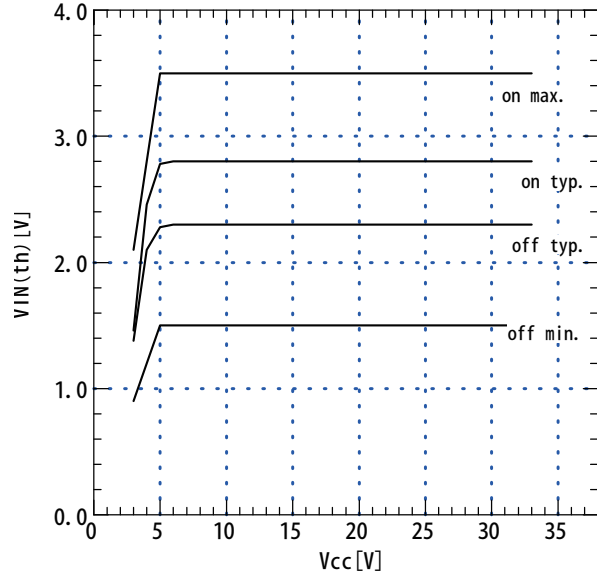
Standby current
 $I_{cc} = f(T_j) : V_{cc} = 13V$



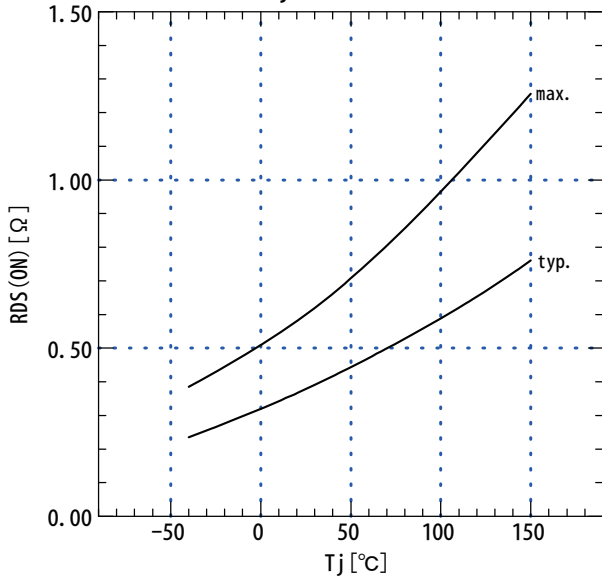
Input threshold voltage
 $V_{IN(th)} = f(T_j) : V_{cc} = 13V$



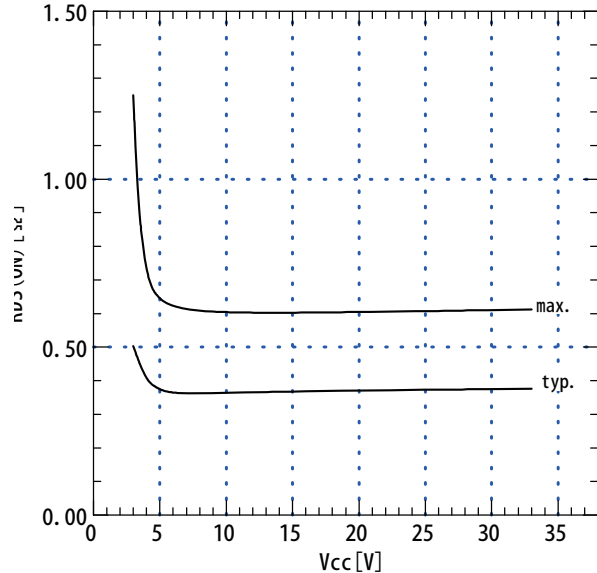
Input threshold voltage
 $V_{IN(th)} = f(V_{cc})$



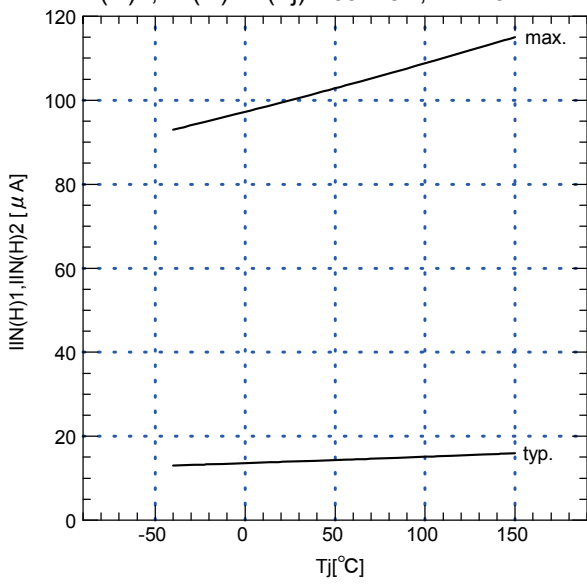
On-state resistance
 $R_{DS(ON)} = f(T_j) : V_{cc} = 13V, I_L = 0.5A$



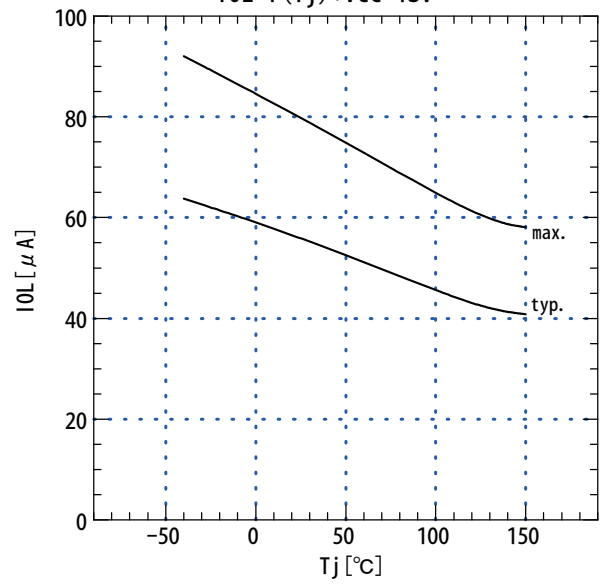
On-state resistance
 $R_{DS(ON)} = f(V_{cc}) : I_L = 0.5A$



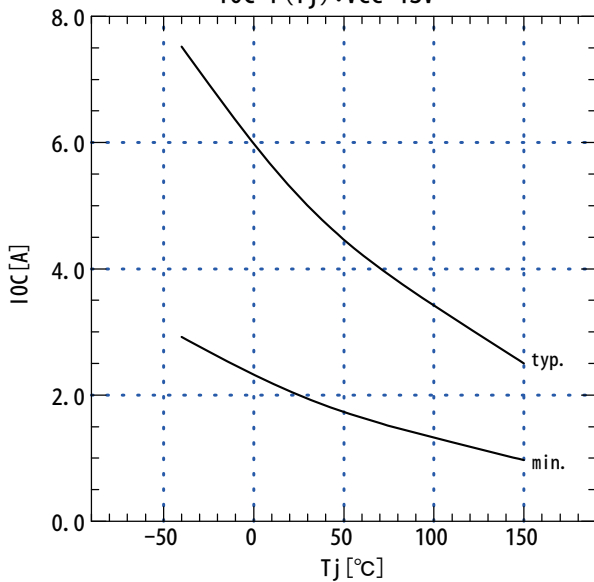
Input current1,2
 $I_{IN(H)1}, I_{IN(H)2} = f(T_j) : V_{CC} = 13V, V_{IN1} \text{ or } V_{IN2} = 5V$



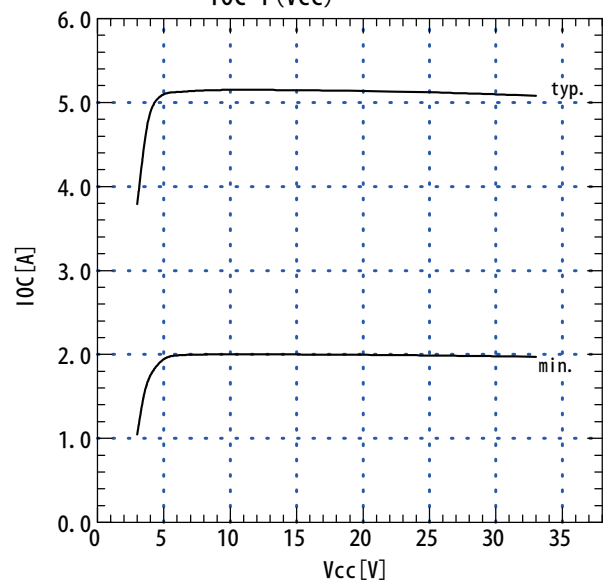
Output leakage current
 $I_{OL} = f(T_j) : V_{CC} = 13V$



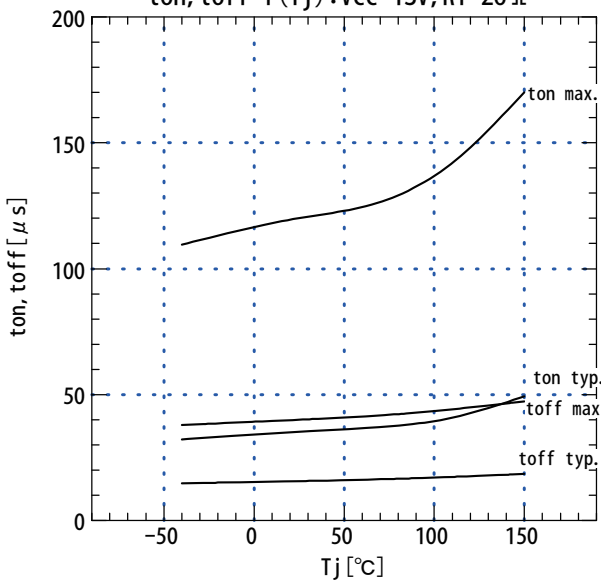
Over-current detection
 $I_{OC} = f(T_j) : V_{CC} = 13V$



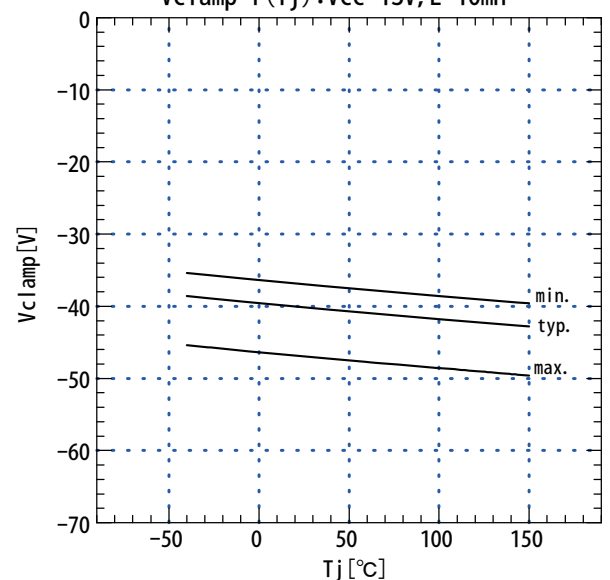
Over-current detection
 $I_{OC} = f(V_{CC})$



Turn-on time, Turn-off time
 $t_{on}, t_{off} = f(T_j) : V_{CC} = 13V, R_l = 26\Omega$



Vclamp detection
 $V_{clamp} = f(T_j) : V_{CC} = 13V, L = 10mH$



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